PEST CONTROL

APRIL 1958

Supermarket Fly Control Is 3-Phase Job; Are You Up On Each Aspect? Pg. 9

These Factors Determine Residual Killing Power Of an Insecticide After It Is Applied . . .Pg. 12

A Ky. Public Health Aide Explains Why Mosquitoes Are Suspected Vectors of Encephalitis . . . .Pg. 16

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Organic Sources For Fly Production and Where To Find Them . . . . Pg. 31

Nation's Economic Lapse Jars Business Volume of PCOs — Restaurant, Bar Accounts Sag . . .Pg. 46

Why Wood Deteriorates–No. 2 of a 3-Part Series on Wood Organisms Pg. 50

Fly control in food-handling establishments is tough going no matter which technique PCOs use because of resistance and contamination problems. Note care serviceman right is using to spray beneath meat chopping block in rear of supermarket. Hygienic Sanitation Co. describes fly control procedure that works for them, starting on pg. 9.

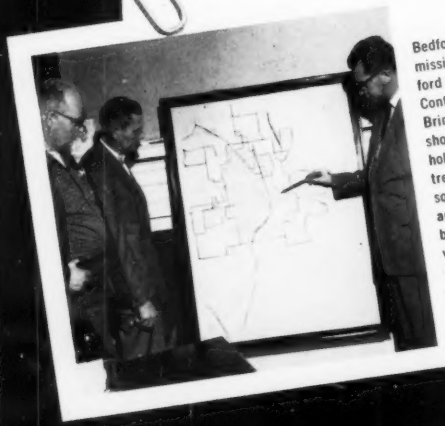
Monthly Magazine of Methods, Chemicals, and Equipment for Urban and Industrial Pest Control and Sanitation Since 1933

CHLORDANE and community spirit end roach infestation in Bedford, Indiana!

How Stone City Pest C

BEDFORD, INDIANA A public minded pest control operator, Chlordane insecticide, and cooperative city officials have eliminated a roach infestation that had long plagued Bedford's 16,000 citizens. The operator is Mr. Clifford Haley, proprietor of Stone City Pest Control. Working in cooperation with the mayor, the street commissioner, and the city Beautification Committee, he donated the time and materials necessary to treat the entire city sewer system for roaches. Control measures were started in July of 1956, and within a few weeks roaches had disappeared from manholes and storm sewer openings. Elated citizens phoned city hall to report that their homes were free of the big black "water bugs" for the first time in years. No more roaches were seen by street department employees until May of 1957, when two or three were noticed in one location. At that time, a second precautionary treatment was made.

Mr. Haley became known as the "man who got rid of the water bugs". Although his roach calls dropped off sharply, the rest of his business increased so much that he rates his part in the city-wide program as "worth three or four years of intensive advertising and solicitation". Perhaps you can follow Mr. Haley's example, in your community, to help your neighbors and increase your business. Like Mr. Haley, you can rely on Chlordane to guard your reputation and, at the same time, increase goodwill! No other insecticide has such a long record of proven effectiveness.



Bedford, Indiana, Street Commissioner J. E. Grogan, Mr. Clifford Haley of Stone City Pest Control, and Mayor Ivan H. Brinegar study street map. Map shows location of the 1500 manholes and storm sewer openings treated with a 2% Chlordane solution, during the city's 1956 and 1957 roach campaigns. In both years, the city supplied workers to help Mr. Haley, and in 1957, the insecticide used was purchased by the city.

Mr. Clifford Haley, Stone Pest Control, applies Chlor to a manhole. Assisting him two city employees, assigned the project by the Street C missioner. In treating the ma holes, Mr. Haley left a wet r idue around the entire in circumference of the open After the first few days, it w found that this could be d effectively by inserting the spr nozzle in the cover drain hole and rotating it 360°. In subse quent treatments, this method was used.

tControl made 16,000 friends!

BEDFORD OFFICIALS PRAISE ROACH CONTROL PROGRAM!

CITY OF BEDFORD
BEDFORD, INDIANA
December 31, 1957

Velsicol Chemical Corporation
330 East Grand Avenue
Chicago 11, Illinois

Gentlemen:

The Bedford roach control program, carried out by Stone City Pest Control in cooperation with the office of the Street Commissioner, was highly successful.

In 1956, before the Chlordane treatment was made, the city's sewers were swarming with roaches. Sewer maintenance men entered manholes only when covered with rubber raincoats. When they came out, the coats were literally covered with big black roaches, which crawled beneath the coats and even down shirt collars.

Since the first application of Chlordane, in July of 1956, you can't find a roach in a sewer manhole. My workers and I open at least 6 or 8 manholes a day, and we did not see a single roach from a few days after the treatment until May of 1957. Then, only one or two roaches were observed in one location. No roaches have been seen to date, since the second spraying in May of 1957.

Very truly yours,
J. E. Grogan, Street Commissioner

CITY OF BEDFORD
IVAN H. BRINEGAR, MAYOR
BEDFORD, INDIANA
December 31, 1957

Velsicol Chemical Corporation
330 East Grand Avenue
Chicago 11, Illinois

Gentlemen:

In answer to your letter concerning Bedford's roach control program in 1956 and 1957, I'd like to say that the results were very good.

Roaches disappeared from our sewer system after the first treatment. The second treatment, which was precautionary, was also 100% effective.

The program was well received by our citizens, many of whom stopped by or called to express their approval. I would recommend that this type of program be made an annual routine in all cities that have a roach problem.

Yours very truly,

Ivan H. Brinegar
Mayor, City of Bedford

MR. HALEY'S RECOMMENDATIONS FOR ROACH CONTROL WITH CHLORDANE:

"Chlordane has always proven effective for roach control, even in homes infested with so called 'resistant' species. I give a ten month guarantee on all roach jobs, and some customers have reported no-re-infestation after two years. In this area, I treat for Oriental, Brown, German, and Brown Banded Roaches. My recommendations are: 1). Use a 2% Chlordane water emulsion spray; 2). treat underneath and outside of homes, and other buildings on the property that might affect the infestation; 3). treat all cracks inside the home; 4). Be sure to get a run-off—let spray puddle over cracks, etc."

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4 **Good flash-in when added to water**

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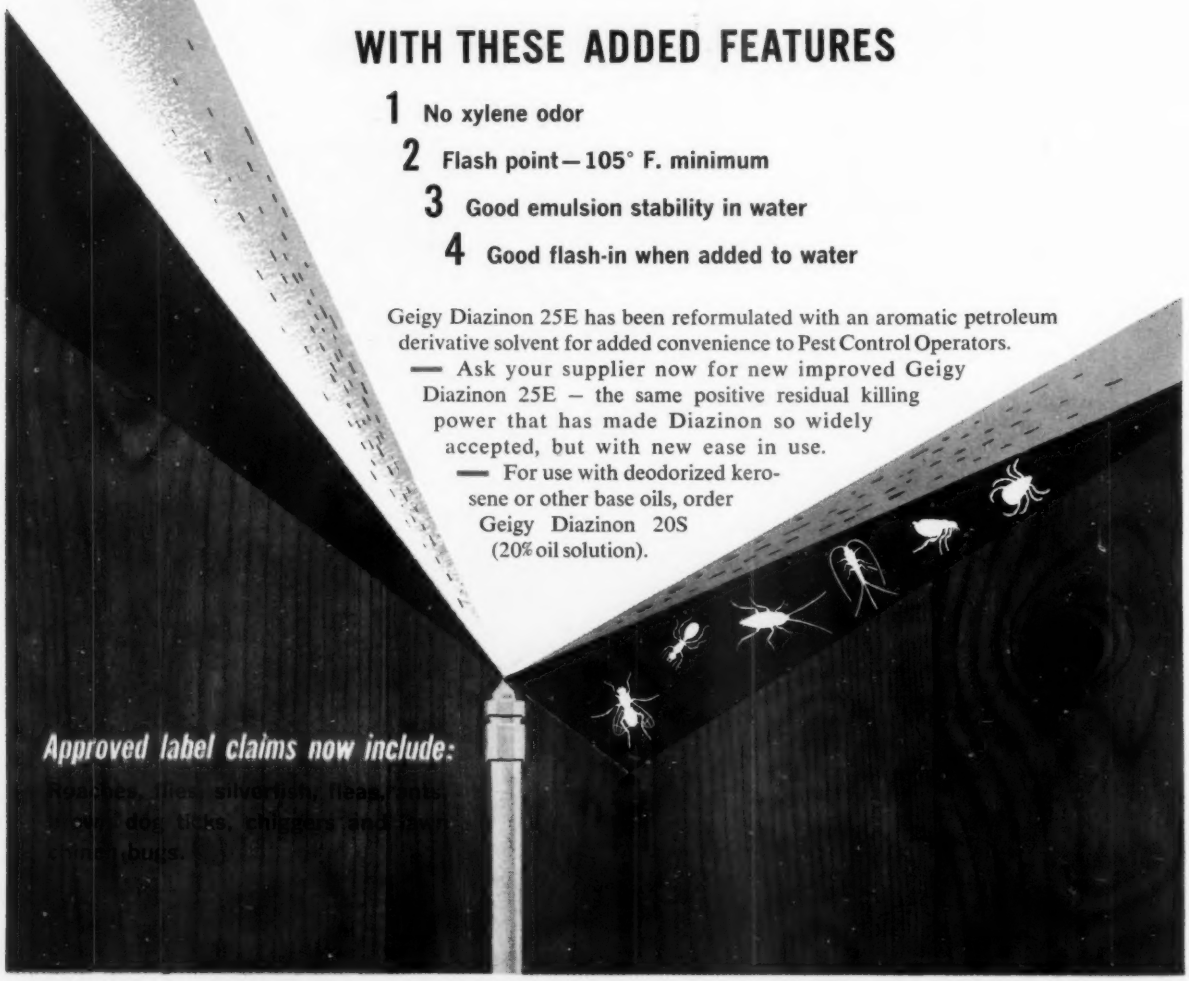
— For use with deodorized kerosene or other base oils, order Geigy Diazinon 20S (20% oil solution).



Approved label claims now include:

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Mistaken Impression

In recent years some have come to look upon the National Pest Control Association as a testing body for new chemicals and, as such, has an obligation to field-test every new pesticide suppliers to this industry would like to market to it.

Such is not the case, nor would it necessarily be desirable if it were.

At infrequent intervals in the past, the NPCA has cooperated with the developers of new pest control chemicals when those chemicals looked like they might solve a particular problem that faced the industry, or, if in the eyes of the Association, there was sufficient proof to suggest a prospect might be useful to PCOs. These were the circumstances when some of the anticoagulant rodenticides were put out to members for experimentation. Safe, yet effective means of rodent control were needed. The coming of resistant roaches made it to the Association's advantage to find new products to control these pests. But such cooperation in the past does not establish an obligation for the future.

There may be dangers in a trade association doubling as a testing agency. There is always the possibility its impartiality may be questioned. If, for reasons the association feels valid, it decides not to field-test a candidate product, such a rejection might be regarded by industry as a kind of "black ball," suggesting the product is unsafe or ineffective when such may not be the case at all. The determining factor is whether or not the product fills a need, is really new, and has sufficient pre-testing to indicate its usefulness to this industry.

Of course it is attractive to have the NPCA do field testing for suppliers, since the Association does not get paid for its efforts. And, if results prove beneficial, the supplier has a kind of official NPCA endorsement for its product. This puts an implied power in the hands of the Association which we are sure it doesn't want.

The NPCA's primary function is to serve its 900 or so members, not suppliers to this trade. In its own interest it may request its membership to field-test a prospective pesticide to help fill a need quickly. But this "sometimes thing" is no reason for suppliers to expect the NPCA must do part of their research or testing if the Association decides otherwise.

The NPCA is not a commercial, independent testing laboratory, and because it isn't suppliers to the trade should not blame it for holding back their own product development simply because the Association chose not to enter into a field-testing agreement.

1933 OUR SILVER ANNIVERSARY YEAR 1958

PEST CONTROL

JAMES A. NELSON, Editor
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Representatives
THEODORE RIEDEBURG, East Coast
JAMES E. MUNFORD CO., West Coast

Volume 26 April, 1958 No. 4

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Published Monthly by
TRADE MAGAZINES, INC.
Publication Office: 324 N. State Street, Painesville, Ohio

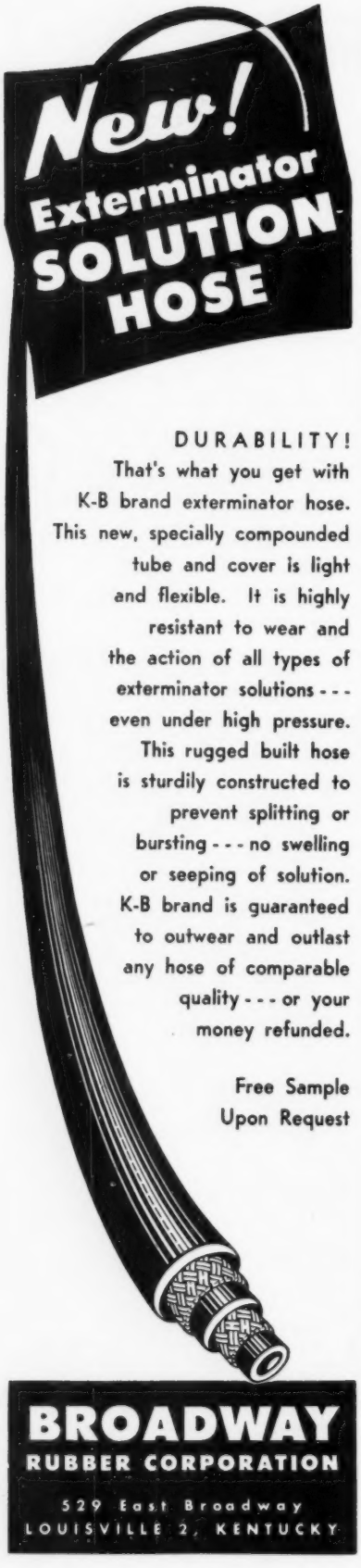
Please send all correspondence to
Editorial and Advertising Offices: 1900 Euclid Avenue, Cleveland 15, Ohio

Cooperating with
NATIONAL PEST CONTROL ASSOCIATION

New York City Advertising Office
Theodore Riedeburg & Associates
415 Lexington Ave., Phone: MUrray Hill 7-1488

West Coast Advertising Office
The James E. Munford Company
517 North Ave. 64, Los Angeles 42, Calif.
Phone: CLinton 5-1547

Single Copy Price: 75 cents; Foreign: $1.00. **Subscription Rates:** U. S. and possessions, Canada and members of the Pan American Postal Union, 1 year, $5.00; 2 years, $8.00. All other foreign subscriptions, 1 year $6.00; 2 years, $10.00. **Change of Address:** Three weeks advance notice is necessary for change of address. Both old and new address must be given. Post Office will not forward copies. Entered as Second Class Matter at the Post Office at Painesville, Ohio, under the act of March 3, 1879.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Letters

More Termite-Hungry Dermestids

Referring to your Notebook "Dermestids on Termite Diet" *(February '58, page 58)*, in which the author, Ron Hunt, asks to hear from pest control operators who have observed Dermestids feeding on termites, we can answer we have.

In February, we put several larvae of beetles, belonging to the family Dermestidae, in a small glass bottle on an office desk. Later after we had made an inspection for termite infestation and arrived back in the office, we put several termites that we had found during the inspection into the same glass bottle with the beetle larvae. A couple of days went by when we noticed the scavengers were feeding on the dead bodies of the termites.

We were still not certain the Dermestids were actually eating the dead termites until we ran across your article in February's *Pest Control* entitled "Dermestids on Termite Diet." This story convinced us these scavengers were indeed enjoying a termite diet.

Frank V. Pace
Columbia Pest Control
Baltimore, Md.

Solubility of EDB

In my article, "Factors Affecting Sub-Slab Fumigant Dispersion in Soil," which appears in your February '58 issue, there is an error which resulted in a typing of the manuscript here before it was submitted to you. I feel a correction should be made, if convenient.

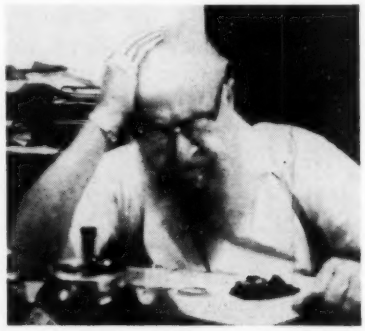
On page 24, under the heading "Moisture Content of Soil," we refer to the solubility of EDB in water as 250 ppm. This sentence *should* read: "A larger degree of moisture, however, will act to tie up EDB to some extent since this chemical is soluble in water in the amount of 1 part in 250 parts or approximately 4000 ppm."

John V. Osmun
Head, Department of Entomology
Purdue University
Lafayette, Ind.

Saigon's Rubber Tree Worm

We were asked some time ago by a big rubber tree plantation company here of the possibility of destroying a very big worm called *Batocera rubus*, which causes serious damage to rubber plantation trees. Neither the local Rubber Research Institute nor the Rubber Research Institute of Malaya could furnish control recommendations.

Can you possibly tell us how to



Saigon Reader Walthausen ponders appropriate control of **Bactocera rubus** on a paper before him. Note size of this wood beetle.

get rid of this worm—what product to use, how to use it, and where we can procure the chemical?

A. Walthausen
Enterprise de Determitage
Saigon, Vietnam

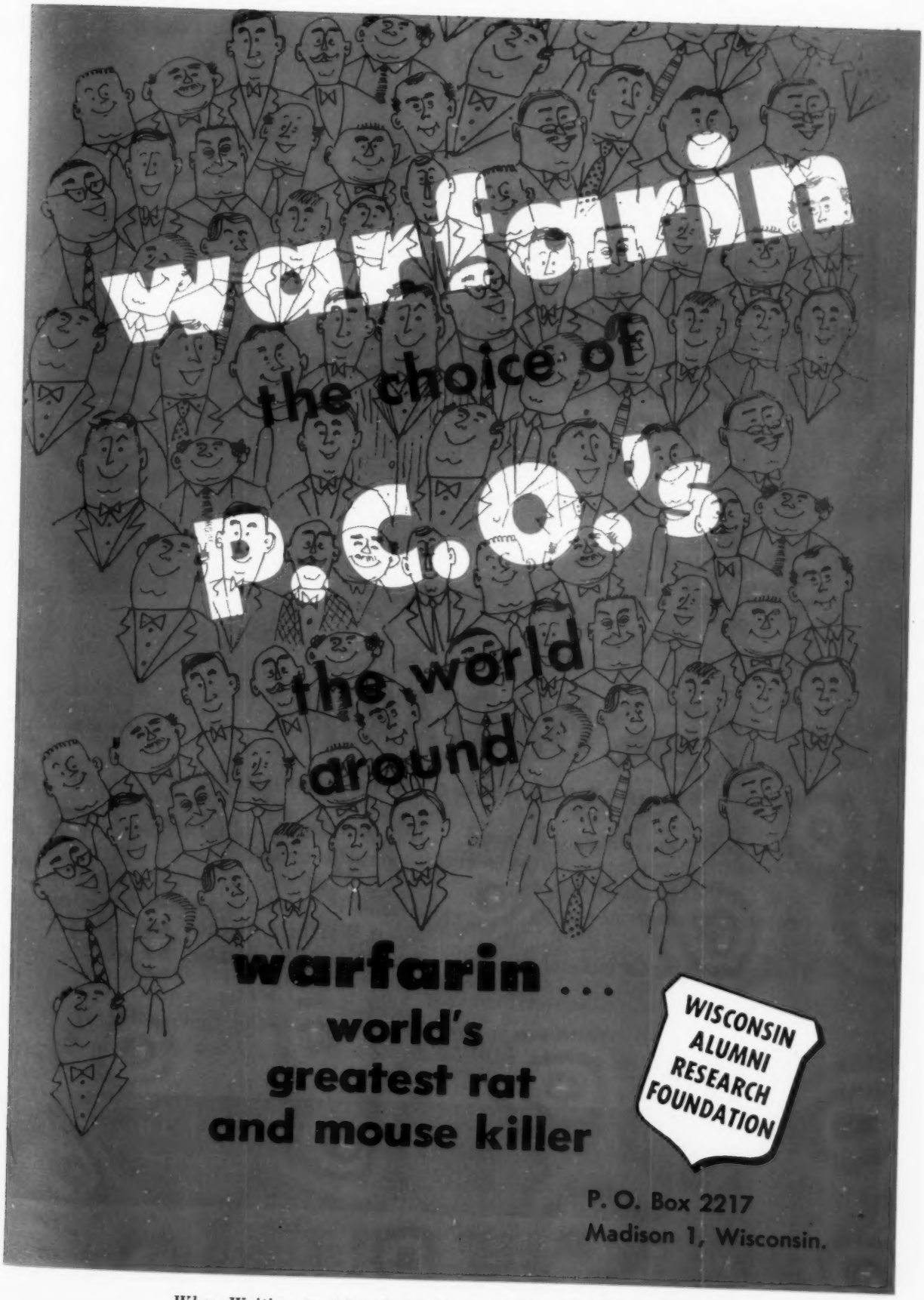
(To obtain an authoritative answer to reader Walthausen's question, PC went to Dr. Thomas E. Snyder, wood-destroying insect authority. Dr. Snyder's reply is printed below. — Ed.*)*

Batocera rubus is a large cerambycid beetle (longhorn) which belongs to a group which makes egg slits in the bark—as do our pine sawyers.

Possibly a spray of a water emulsion of 0.4-0.8% gamma isomer benzene hexachloride would *prevent* attack. A sufficient amount should be 4.75 fluid ounces per square foot. I doubt that this will kill these borers in the trunks and roots, but it might. A 0.3-0.5% water emulsion of dieldrin might be a substitute, especially as a remedy.

Thomas E. Snyder
Washington, D. C.

Pest Control welcomes expressions of opinions from its readers. Send ideas and comments as briefly as possible to James A. Nelson, Editor, Pest Control, 1900 Euclid Avenue, Cleveland 15, Ohio.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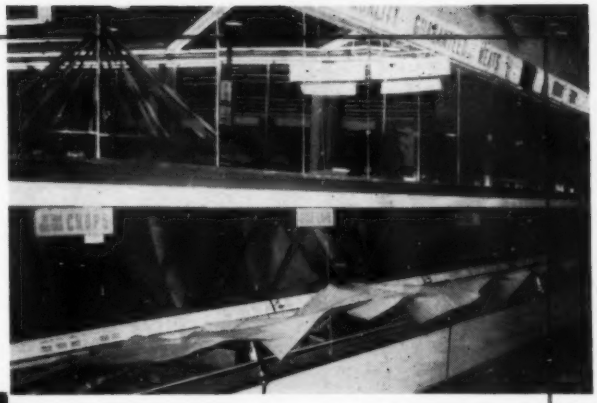

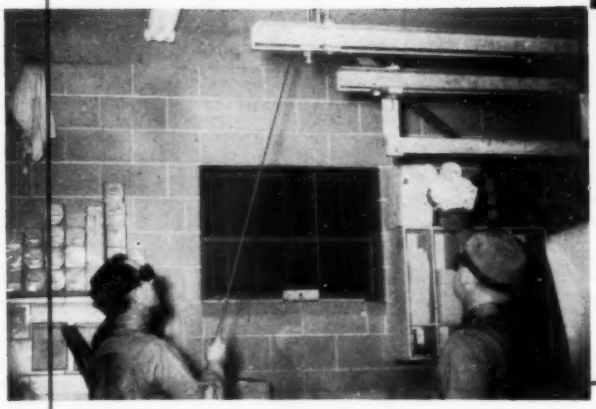

by
S. JAMES HENRY
Hygienic Sanitation Co., Philadelphia, Pennsylvania

FLY CONTROL is a tough assignment in any kind of food-handling establishment that PCOs service, but one of the toughest is the neighborhood supermarket where there's every type of fly attractant and easy access through doors that are constantly opening or closing. We've licked the problem in recent years, and I'd like to tell you how.

Effective fly control in supermarkets is contingent upon three fundamental principles: (1) sanitation, (2) prevention, and (3) chemical control. Omission of any one from the pest control operator's program could seriously reduce the effectiveness of his control efforts.

Sanitation

Sanitation, broadly speaking, is the proper disposal of fly-breeding media. This should include a periodic clean-up of grease traps and drains, and elimination and proper disposal of any decaying organic material on the premises. Scraps of food, carcasses or other media conducive to fly breeding that might be found under counters, tables, etc. must be eliminated.

Until such waste is permanently disposed of, it should be stored in metal garbage containers. These must be washed and **scrubbed** regularly to remove any accumulation in the bottom of the can that might encourage fly breeding.

Garbage disposal at supermarkets should be made at least three times a week to prevent propagation of flies.

Use of screening or some similar barrier to prevent fly entry into a premises undergoing treatment is another chief requisite of an effective fly control program in supermarkets. All doors and windows must be properly screened. Screen doors should have strong springs to keep them shut. In areas where screens are impractical or impossible to install, such as at loading docks, etc., fans can be used to discourage fly entry. Amber lights and fly traps or paper help keep flies out of the food service area.

Chemical Control

The third step in supermarket fly control—proper application of chemicals—is the one PCOs are more directly responsible for. You must have the proper equipment to put the chemicals where you want them and in the right amounts.

We believe the most suitable type of sprayer is a non-pulsating, compressed air sprayer having a range of 80 to 110 pounds pressure. We use a BiG power sprayer, which has a four-piston, radial type non-pulsating pump. Others are made by Essick and Tokheim. Units should be non-pulsating to prevent uneven application of your chemical on surfaces. Pressures of between 80 and 110 pounds seem to be most desirable since they cause a minimum of spray rebound off the surface and do not cause excessive droplet formation. The capacity of the sprayer's tank can vary from 10 to 150 gallons, depending upon the operator's needs, but the tank should be of corrosion-resistant metal and have agitation for use when you're applying emulsions. The sprayer we use has a 150-gallon capacity.

Chemically-resistant hose must also be used to prevent hose swelling that reduces chemical output and slows down your work. The inside diameter of the

This article is based on a talk given at the 1958 Purdue Pest Control Conference.

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REPORT

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hose can vary from between 3/8" to 3/4", depending upon your own preference. Hose lengths can also vary. Because our sprayer is outside the market during treatments, the crew has two lengths of hose. One is 200 feet long and the other, 100 feet; these two can be coupled together when a longer hose is needed.

Hose extension wands should be three, five, and seven feet long. Short extensions are for applying chemicals to walls, floors, counters, etc. with a minimum amount of stooping or stretching, and the long wands are for treating ceilings and other high areas easily.

Your spray gun should be fitted with a positive shut-off to minimize dripping.

As for nozzles, we prefer the Spraying Systems Series 8001, 8002, 8004, and 8006. We carry all four on a fly job. The 8001 and 8002 sizes appear to be most practical for carefully applying a fine spray on painted interior surfaces where staining or runs could be a problem. For exterior applications, nozzles with larger openings, such as the 8006, are most desirable.

Preparation

But before you can start spraying any chemicals in a supermarket, you must adequately cover and protect all merchandise that might be damaged or contaminated by drift or droplets of your chemicals. Such goods that could be stained by spray particles include cellophane, displayed electric bulbs for resale, polyethylene-bagged merchandise, and displayed plastic products such as toys, dishes, and housewares.

Similarly, all food preparing surfaces must be protected against contamination, including meat blocks, tables, or other surfaces where food is prepared, and exposed food containers such as frozen food lockers, dairy cases, pickle barrels, etc.

Chemical Application

Technique, experience, and know-how are required to apply chemicals correctly. Enough chemical must be applied to surfaces to produce a residual killing effect, but not too much chemical that might cause runs, blooming, or stains. You can develop the right technique through practice.

Residual insecticidal application must be concentrated on fly resting surfaces and potential breeding spots in the supermarket you're treating. Night-resting sites include lights, ceilings, walls, strings, pipes, etc. Resting sites used in the day by flies are garbage areas, breeding and feeding media, screens, etc.

The proper inside insecticidal application includes residual treatment of the primary night-resting sites, and treatment in and around fly breeding and feeding areas such as garbage containers, meat blocks, counter bases, etc.

Special attention should, of course, be paid to most frequent fly-resting sites—walls, ceilings, lights, etc. Flies seem particularly attracted to edges of light fixtures, edges of signs, and pipes or cords hanging down from the ceiling. Spray around counters, tables, etc., and include floor areas where adult flies are feeding. Special emphasis must be given to garbage containers, legs of tables and meat blocks, and areas around windows.

The PCO should get an even coverage of his insecticide with no run-off, using an 8001 tip at approximately 100 pounds pressure with the nozzle held about 12 to 18 inches from the surface.

Sometimes we use a Lethalaire bomb to get quick knock-down in an emergency call and we recommend and sell these aerosols to supermarket owners so they can immediately handle sudden changes in fly migration conditions caused by rain, shifts in the wind, etc. that may bring a swarm of flies inside to bother customers.

Outside Treatment

Increased quantities of chemicals should be applied to outside areas which are naturally subjected to weather conditions and where there is little possibility of staining. An 8006 tip is used at approximately 110 pounds pressure with the nozzle held about 12 to 18 inches from the surface.

Spray around windows, doors, screens, other openings, etc., and spray screened doors and windows inside and out. Particular attention should be paid to garbage and refuse areas outside the building, including incinerators and storage areas for soda, beer, or other opened bottled or cased materials that are ideal fly attractants.

The choice of insecticide you will use depends upon the degree of resistance in your area, and upon your own particular preference. In 1954 when we were using 1% malathion emulsion, we had 21 retreats in 65 applications but these call-backs resulted primarily from poor control being caused by an insecticidal odor problem.

Of 206 applications in supermarkets made in 1955 with 1% malathion emulsion, we had only 9 retreats, giving us 95% control. That year we also used 1% Diazinon emulsion on 80 supers and had no call-backs. In 1956, when we serviced 229 applications, and in 1957, when we did 308, all with 1% Diazinon emulsion, we realized 100% control, using the combination of control techniques discussed in this paper.

Record of Fly Control Effectiveness at Supermarkets During Four-Year Period

Year	Chemical	No. of Applications	No. of Retreats	Percentage of Control
1954	1% Malathion Emulsion	65	21	67%*
1955	1% Malathion Emulsion	206	9	95%
	1% Diazinon Emulsion	80	None	100%
1956	1% Diazinon Emulsion	229	None	100%
1957	1% Diazinon Emulsion	308	None	100%

*Lesser control due to incomplete application resulting from odor problems.

We've Kept A Record of Results

During the last four years we have kept a record of the kind of results we've obtained in our fly control efforts at supermarket accounts. The accompanying table reveals the percentage of control we had after one application during each 30-day period. The degree of control was deter-

(Continued on page 71)

Fate of Insecticides After Application

by DR. D. L. SHANKLAND
Department of Entomology, Purdue University
Lafayette, Indiana

WHEN INSECTICIDES are applied in situations where residual effectiveness is required, success or failure of treatment depends directly upon what happens to the insecticide after application. If, for some unknown reason, a material does not perform as experience would indicate it should, this could cause someone to lose money, and the chances are it will be the applicator who would be the loser. For this reason alone, it is not entirely academic for pest control operators to know something about the fates of insecticides.

But, in addition to this economic aspect, a knowledge of the fates of insecticides may allow one to predict the outcome of a given control measure more accurately than he could otherwise. This would apparently lead, in many cases, to an improvement in the quality of one's service.

The possible hazard to the health and welfare of innocent bystanders also cannot be overlooked. This is directly dependent upon the fate of an insecticide after it is applied.

There are many factors affecting the residual effectiveness of insecticides, some of which exist even before an application of them is made. The insecticide itself, its formulation, as well as the method of application are all important. Only after consideration has been given to all factors, both before and after application, can one feel he has tried to obtain the maximum efficiency from any given insecticide.

Nearly everyone who has anything to do with insecticides knows something about their fates through a knowledge of residual activity.

All know a great deal of variation in the effectiveness of residual life can be expected among insecticides. There are residual deposits which last for years, such as those indicated by Hetrick's (1957) work. Here, BHC, chlordane, dieldrin, aldrin and heptachlor, mixed with soil, are, after seven to ten years, still killing subterranean termites. Lichtenstein (1957) found significant amounts of DDT in turf plots, which had not been treated with DDT during the ten years prior to his investigation.

There are residual deposits effective for intermediate periods, such as those of chlorinated hydrocarbons applied to exposed surfaces.

There are those residues of relatively very short duration, such as those associated with the plant derivatives: pyrethrum, nicotine, and rotenone. The organic phosphate insecticides are also generally characterized by relatively short residual lives.

Finally, there are those insecticides which undergo chemical conversions to different, but still insecticidal, compounds.

Some of the factors which affect the fate and residual activity of insecticides can be considered.

Effect of Formulation

First of all, the formulation may have some bearing. Barlow and Hadaway (1952) found that when applied to fibrous or absorptive surfaces, wettable powders of DDT were more effective than oil solutions or emulsions. They believed that when oil solutions or emulsions were applied to these surfaces, the DDT was held in supersaturated solution between the fibers, and was not available to insects. Only if crystallizaton could be started mechanically, would small crystals of DDT be formed which would protrude from the surface and become available to insects.

Blackith (1952a, 1952b, 1952c) showed that the residual life of pyrethrins, when exposed to ultra violet light, could be just about doubled if phenylazo-2-naphthol were included in the formulation. This compound is an oil-soluble dye, which absorbs ultra violet light. The same compound was found to retard detoxification of DDT by ultra violet light.

Tsao and his co-workers (1953) showed that 300 mg. per sq. ft. of lindane, applied to glass, completely disappeared in 50 days. This disappearance was attributed to the vaporization of lindane. If chlorinated polyphenyl were added, however, the same deposit of lindane was decreased by only 13½% in 149 days. The residual life of lindane against houseflies was extended from slightly over one week to more than five months, by the addition of this compound.

These then, are examples of improving the residual activity of insecticides through formulation.

Method of Application

The method of application may also have some effect on the fate of insecticides. Large volume, dilute spraying, to the point of run-off, with slow breaking emulsions, leads to a loss of insecticide in the liquid running off the treated surface. This would not be the case in such spraying with quick breaking emulsions, or in concentrate spraying when the point of run-off is not reached. Mist spraying, with a solution of insecticide in a highly volatile solvent, may result in significant amounts of insecticide never reaching the desired site of application, due to the evaporation of the solvent before it reaches a surface.

Physical, Chemical Properties

The physical and chemical properties of insecticides are inextricably involved with their fates. The rapid dissipation of lindane, due to its relatively high vapor pressure, has already been mentioned. The detoxification of

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pyrethrins and DDT by ultra violet light has also been touched upon. The oil and water solubilities are also important. Compounds readily absorbed and translocated by plants, such as the systemic organic phosphate insecticides, generally show a relatively high water solubility. On the other hand, insecticides having a high oil solubility, as most of them do, are readily taken up by oils or lipid surfaces. In some cases, this may be desirable, such as when insecticides are held by wax layers of leaves of plants (Fransen and Kerssen, 1953). In other cases it appears it might be disadvantageous, such as where application of DDT emulsions to waxed wood surfaces were found by Fay et al (1948) to be non-toxic to mosquitoes a short time after application.

The chemical properties of many of the organic thiophosphates are such that they may, under certain conditions, be chemically altered to sulfones or sulfoxides, or to other analogues of the parent compound, which are highly active insecticides themselves. Some such products are both more active and more persistent than the parent compound. Aldrin and heptachlor, under proper conditions, undergo oxidation to dieldrin and heptachlor epoxide respectively, both of which are good insecticides.

Influence of Surfaces

Surfaces of various kinds have some marked effects on insecticides. Harrison (1957) applied DDT emulsions to painted wooden surfaces, and found that on fresh oil paint, a deposit of 200 mg. per sq. ft. was inactive against flies. On old oil paint, however, the same dose was effective against flies for about 11 months. On enamel, an effective residue was retained for almost four years. On water base paint, the effective residual lasted for about two and a half years.

Teatio and Dahm (1950) found that on unpainted or painted plywood panels, exposed to the elements, the order of residual activity for several insecticides, from longest to shortest, was: dieldrin, aldrin, parathion, chlordane, and lindane. All of these compounds lasted longer on unpainted surfaces than they did on painted ones. On white washed surfaces, aldrin and dieldrin lasted as long as they did on painted surfaces, but all of the other compounds lost their toxicity more rapidly.

Fay and co-workers (1948) applied DDT emulsions to a variety of surfaces and found that residues toxic to mosquitoes persisted for six months on dry bamboo, bark, rusty metal screen, rusty sheet metal, and pine plywood. One to two months residual was obtained on glass, tile, new metal screen, and sheet. Plexiglas, shellacked wood, waxed wood, and concrete gave low mortalities from the beginning.

An interesting situation was described where DDT was applied to teak. (Ranganathan et al, 1949). It had been first noted that a residual deposit of DDT, too low to kill mosquitoes, on a glass plate could be rejuvenated by storing it in a box made of Burma teak. It was later found that a compound called tectoquinone was a normal constituent of teak, and that this compound potentiated the action of DDT.

Efforts to control mosquitoes in certain parts of the world have been thwarted by the effects of certain kinds of mud on DDT, BHC, and dieldrin. (Paulini, 1956; Bordas et al, 1953) These areas are where natives live in houses built of mud bricks, and the insecticides are sprayed on the walls. These control measures are a part of the World Health Organization effort to eliminate malaria from the world. The muds, which cause trouble, absorb the insecticide so rapidly that the deposit disappears in a matter of minutes. It has been shown that DDT does not penetrate the mud more than 1.5 mm. and 80% of the deposit is retained in the outer 0.5 mm. (Miles and Pearce, 1957). That is deep enough, however, to remove the insecticide from possible contact with insects landing or crawling over the surface. This adsorption takes place on dry mud, when humidities are low. During periods of high humidity, the insecticide returns to the surface, and will again provide control of mosquitoes.

Efforts were made to find methods of pre-treating the mud to prevent the adsorption. Just to show you how an active imagination may be of value in solving a problem of this kind, two workers in India (Kruse and Konchardy, 1950) tried treating the walls with a mixture of coconut charcoal and cow dung, probably because they had a good supply of these materials available. The amazing thing is that it worked.

Climatic Factors

Climatic factors contribute to weathering of residual deposits. Gaines and Mistric (Gaines and Mistric, 1951, 1952; Mistric and Gaines, 1953, 1954) studied the effects of a variety of factors on residual effectiveness of various insecticide emulsions applied to cotton. They found that, in general, high temperatures, wide ranges of relative humidity, sunshine, and dew, or a combination of these decreased the residual effectiveness of most insecticides. Toxaphene, dieldrin, and EPN, however, retained their activities under extremes of these conditions better than malathion, isodrin, BHC, DDT, and endrin. Aldrin was the most seriously affected of all compounds tested. In the absence of wind, but on exposure to other climatic factors, toxaphene was more persistent than aldrin, dieldrin, or endrin. In the presence of a five mph wind, however, the toxicity of the toxaphene residue was decreased more than that of any other compounds tested. Wind also contributed to some extent to the loss of activity of dieldrin and endrin deposits.

One half inch of simulated rain applied to treated plants soon after application had little effect on residual lives of toxaphene, EPN, parathion, endrin, and isodrin, but it did cause considerable loss in the toxicities of heptachlor, methyl parathion and malathion residues.

If simulated rain were applied 24 hours after applicaton, however, all of the materials showed greater reduction in toxicity than when it was applied soon after application.

Dew alone had only a slight effect on residues.

High temperatures, up to 116 degrees F., reduced the toxicities of toxaphene, EPN, aldrin, dieldrin, and heptachlor. Aldrin and heptachlor were the most susceptible to detoxification by heat.

Relative humidity may have some effect on the toxicities of residues, but the effect may be difficult to predict. Pradhan (1949) showed that films of DDT were more toxic to the red flour beetle at high humidities, than at low, but just the reverse was

(Continued on page 70)

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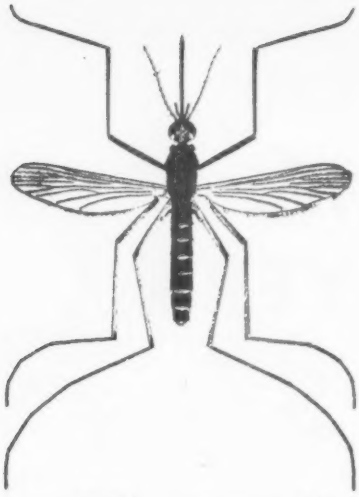


Mosquitoes May Be the Primary Vectors of St. Louis Encephalitis

by ROBERT E. WOODRUFF[1]
Entomologist, State Department of Health
Louisville, Kentucky

THE TERM "ENCEPHALITIS" means simply an inflammation of the brain. There are many types of encephalitis, some of which are transmitted by Arthropods and some which are not. Members of the latter type are such common diseases as measles, mumps, influenza, chicken pox, etc. The so-called "Arthropod-borne Encephalitides" comprise three major diseases in the United States which are caused by the "arbor"[2] viruses. These are: Eastern Equine, Western Equine and St. Louis Encephalitis. Some of the common names used for these three diseases are "Sleeping Sickness" (not to be confused with the African Sleeping Sickness which is caused by a protozoan) and "Brain Fever." The first two of these are primarily diseases of horses but occasionally of man. They also occur in domesticated birds such as turkeys, pheasants, etc. Eastern Equine Encephalitis occurs along the Atlantic and Gulf Coasts from New Hampshire to Texas, while Western Equine Encephalitis occurs most commonly west of the Mississippi River with occasional cases in Eastern states.

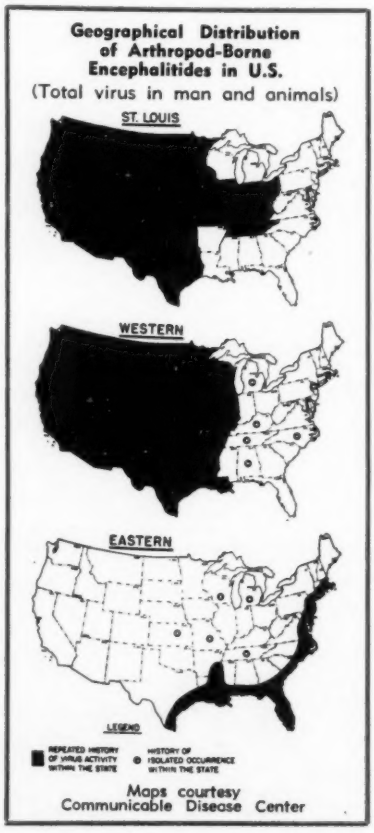
In Many States

In Kentucky, St. Louis Encephalitis is the disease of major concern. It has occurred in all of the states west of the Mississippi except Arkansas and Louisiana and in the East in Illinois, Indiana, Ohio, Kentucky and Tennessee.

St. Louis Encephalitis was first known from Paris, Ill., in 1932. However, the disease did not reach epidemic proportions until 1933 at St. Louis, Mo., whence the name. Although St. Louis Encephalitis is generally considered a human disease, it does occur in horses and mules as a subclinical or inapparent infection.

Symptoms

This disease shows a variety of symptoms, but a mild case is generally characterized by headache, fever, malaise, and mental disorientation. In a fatal case, these symptoms are present plus stiff neck, lethargy or confusion, stupor, coma, occasional convul-



1. The author wishes to express his thanks for assistance and corrections to Mr. Ralph C. Pickard, Director, Division of Engineering, Kentucky State Department of Health, and to Dr. Stephen Chapman, Scientific Director of Laboratories, Kentucky State Department of Health.

2. "Arbor"—the first two letters from "Arthropod" and the last three from "borne."

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sions, and death. These symptoms are general and correspond to those of many other diseases. St. Louis Encephalitis is sometimes incorrectly diagnosed as polio. Often times, especially in children, there are sequelae following a recovery of the disease, which may include mental retardation, convulsive seizures, spasticity, or other milder effects.

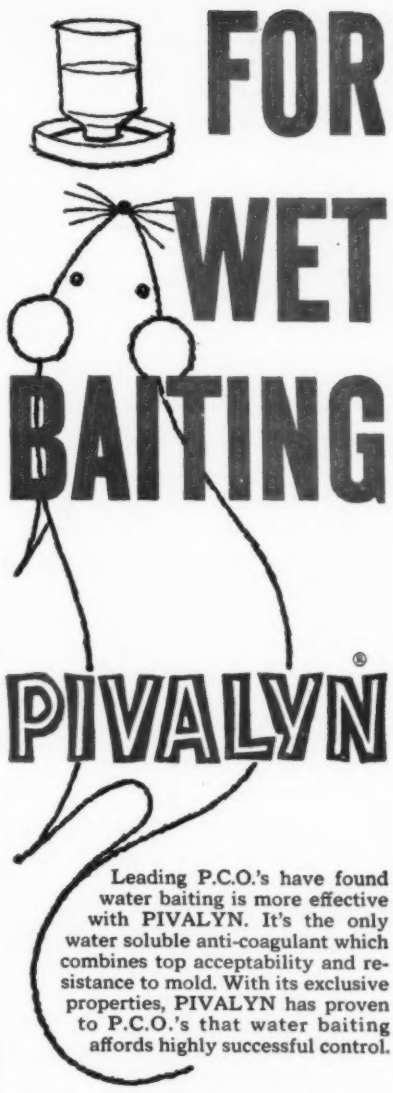
Encephalitis Virus Mystery

Viral diseases continue to baffle scientists and very few viruses are well-known. Some scientists believe viruses are merely chemical and produce reactions of purely a chemical nature. The virus of St. Louis Encephalitis differs from the others but since these viruses are very small and cannot be seen under an ordinary microscope, they are difficult and dangerous to detect. It is, therefore, necessary to use special laboratory techniques to indicate the presence of these viruses. The most common laboratory procedure for testing for the presence of encephalitis virus infection in man is the complement fixation test of blood samples. In these tests it is necessary to obtain two blood samples two weeks apart in order to determine a rise in titer against specific antibodies.

In testing for the actual presence of virus in mosquitoes it is necessary to take many precautions in order to get positive results. The mosquitoes are collected alive and brought to the laboratory where they are killed by freezing. Here, they are ground up and mixed with a buffered saline solution and subsequently extracted and the extract injected into the brains of very young live mice. If these mice die within 20 to 30 days, it is probable that one of the encephalitis viruses was present in the mosquitoes, but it is not known which specific virus.

Brains of these mice showing encephalitis are re-injected into three additional groups of mice which have been previously given known antibodies against the three types of encephalitis. Depending upon which set of mice survive, it is determined which disease is present.

Vectors of St. Louis Encephali-



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tis are still very poorly known although it seems evident that mosquitoes are the primary ones. Very few isolations of the virus have been completed from field-caught specimens of mosquitoes in the Eastern United States. A great number of virus isolations have been made from western mosquitoes. Although we have 43 species recorded from Kentucky, at the present time it seems most likely that only one is of major importance. This is *Culex pipiens-quinquefasciatus*, which is the common vector in the Eastern United States. *Culex tarsalis* is the best known vector in the west.

Wild birds are apparently the natural reservoir of this disease although most workers believe that the virus does not survive in birds for long periods.

One important unknown fact regarding St. Louis Encephalitis is what happens to the virus during the winter months. Studies of overwintering mosquitoes in Kentucky caves have been initiated by the writer to determine if the virus is present in them at this time. Bats are also being investigated as a possible overwintering reservoir since they occupy the same shelters as do the mosquitoes when hibernating.

Outbreaks Sporadic

Outbreaks of St. Louis Encephalitis in the United States have been very sporadic and at the present time there is no means of predicting an outbreak of this disease. It can occur in any year or any place when the vector is abundant and the virus is present in a reservoir of wild birds. It generally occurs only in the fall of the year with August and September being peak months. Although Kentucky has had occasional cases scattered throughout the state during the past 25 years, there had been no major outbreaks until 1955. At this time serious outbreaks were also reported from Illinois and Indiana.

The greatest number of cases in Kentucky were in the western portion of the state at Calvert City. This city has a population of approximately 1500 and between August 15 and October 7, 1955, 13 cases of St. Louis Encephalitis were recorded from this area. There were four deaths. The age range of clinical cases was from 6 to 89 with a mean of 48 and a median of 46. In order to determine the inapparent infection, 100 blood specimens were drawn at random for serological examination, and a great many of these proved positive for antibodies against St. Louis Encephalitis, indicating that the patient had been exposed to the disease at some time or other. Sixteen wild birds were shot and blood samples taken for virus isolation. Virus was found in a flicker, which is the first time this bird has been incriminated. Mosquitoes were collected for virus tests with one pool of *Culex pipiens-quinquefasciatus* proving positive for the virus.

An interesting fact associated with this outbreak is that 11 of 18 cases had chickens in close proximity to the residence. Control measures consisted of hand

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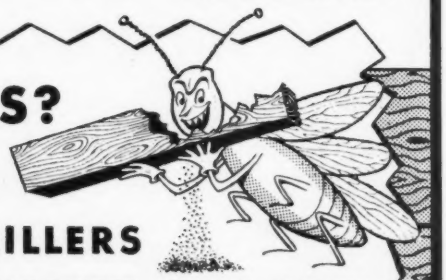

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In 1956 two other areas in Kentucky were affected by serious outbreaks of this disease. Louisville had approximately 100 cases with 10 deaths and Fulton, on the Tennessee line, had a few cases. The death rate, in most instances, was approximately 10% with a few of the cases suffering after effects. However, this high death rate may not be accurate due to the number of sub-clinical or inapparent cases.

Culex pipiens-quinquefasciatus is the common household mosquito of the Eastern United States and is one of the most common mosquitoes in this geographical area. These mosquitoes breed in a variety of habitats including artificial containers of all types and polluted waters containing organic wastes. A heavy production of these mosquitoes generally indicates unsanitary conditions. In Louisville one of the prime breeding containers for *Culex pipiens-quinquefasciatus* was sewer catch basins. The city has approximately 30,000 of these. These mosquitoes are fond of human habitation sites for daytime resting stations and are commonly found in such places as houses, outbuildings, and chicken houses. It is one of the most difficult species for organized control since most of the breeding areas are not in marshes or swamps but in peoples' "own backyards." It is surprising how few people realize that "wiggletails" or "wigglers" eventually turn into mosquitoes. Most people would rather pay to have their insect pests exterminated than to improve sanitary conditions by ridding their premises of containers. A great part of the problem, as we see it, is a matter of education and is of necessity a long range program.

Kentucky Control Program

Mosquito control in Kentucky, at present, is merely on an emergency basis, and no formal organized mosquito control, such as abatement districts, has been set up. In recent years more emphasis

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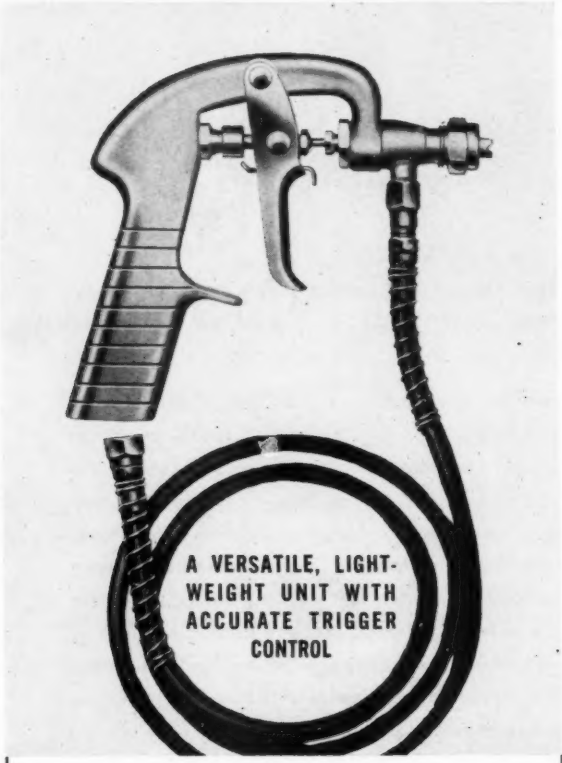

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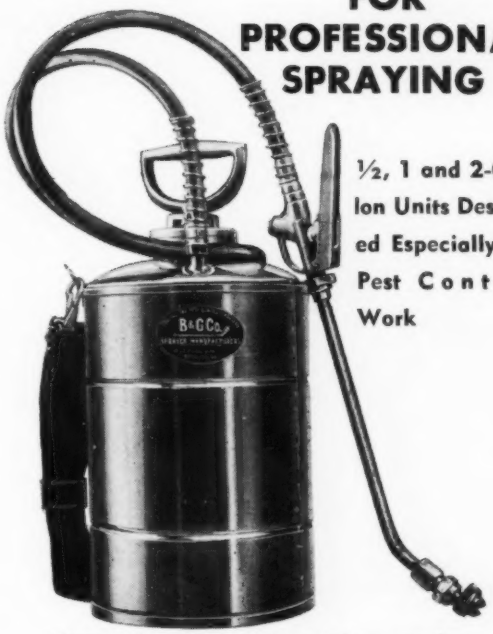

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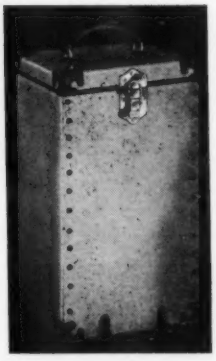

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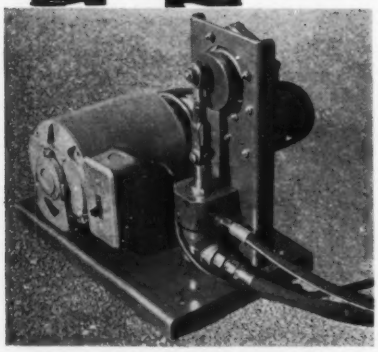
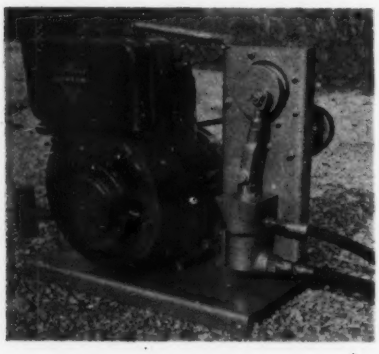
AND as an added service — when you lease HI-FOG equipment you get free consultation service by Trojan Laboratories, an outstanding authority on Pest Control Methods, materials and dosages.





POWER LOADERS

There are two types of Power Loaders available to operators leasing Hi-Fog units. Each makes possible three minute loading. One Power Loader will easily handle several Hi--Fog Units.

Illustrated left top is Model A-1 Electric Loader for use when units are loaded in the shop or where power is readily available. Left lower is Gasoline Type for field and on-the-job loading.

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The HI-FOG method and efficiency makes quick work of controlling insects. In stored food products, restaurant kitchens, dairy barns, etc., the HI-FOG unit does a better job, faster and easier. For example, a five room house including sub floor, attic and garage is easily and thoroughly treated in less than 15 minutes with one quart of concentrated insecticide.

Box Cars, Dairy Barns, Greenhouses, Warehouses, Ship Holds, are treated with the same efficiency, providing a longer lasting residual control.

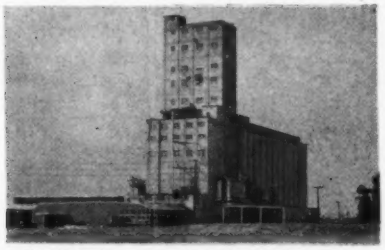
You determine the dosage and put it where you want it.

Present users include large Milling and Seed Companies, hundreds of leading Pest Control Operators, U.S. Army, Navy, and Department of Agriculture, as well as University Experimental Stations. Why not enjoy all the advantages Hi-Fog sprays can give you by taking advantage of the low cost lease plan. Send now for additional information.

SPECIAL NOTE TO PRESENT OWNERS

Write for information on our service policy and how you can convert and renew your present equipment.

The penetration of HI-FOG atomized spray is perfect for use in ship holds, dock storage, etc.



HI-FOG is the answer to pest control problems in Grain Elevators, Seed Storage Facilities, etc.

Perfect control of spray makes it ideal for restaurant kitchens, food processing plants, etc.

Warehouse, truck and freight car control is quick and easy with HI-FOG.

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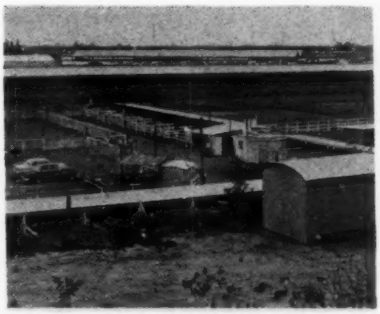

Does an outstanding job in Dairy Barns, Stables and Poultry Houses.

Ideal for spraying both inside and out in Motels, Hotels, and Residential Dwellings.

BANTA HI-FOG COMPANY

has been placed on pest species control than previously. In Kentucky one of the most serious pest species, at least in three western counties, is *Aedes sollicitans*, the so-called Salt Marsh Mosquito. In 1956 the State Legislature appropriated an emergency fund of $60,000 for the fiscal year 1956-57 and an equal amount for 1957-58 for the control of *Aedes sollicitans* and *Culex pipiens-quinquefasciatus*. This fund was allocated to the State Department of Agriculture. A Stearman biplane has been purchased and was used almost exclusively in these "hot spot" areas during the 1957 season.

From July 1, 1956 to October 1, 1957, more than 141,200 acres have been sprayed in Hopkins, Henderson, Muhlenberg, Webster, Marshall, Fulton, Graves, and Crittenden counties. The first four of these counties were sprayed primarily for *Aedes sollicitans* with the remainder for control of the encephalitis vector and other pest species. A total of 15,000 gallons of DDT 25% emulsifiable concentrate and 60,000 gallons of No. 2 fuel oil were used. This 5% solution was applied at the rate of 3 quarts per acre by the plane flying at 70 m.p.h. at tree top level and covering approximately 100-foot-wide swaths. The spray rig consisted of 12 nozzles per boom and a tank capacity of 200 gallons. In addition to the aerial spraying, 1,650 gallons of 25% DDT emulsifiable concentrate were given to residents in Hickman, Fulton, McLean, and Muhlenberg counties for hand spraying programs. At the present time enabling legislation for mosquito abatement districts is under consideration.

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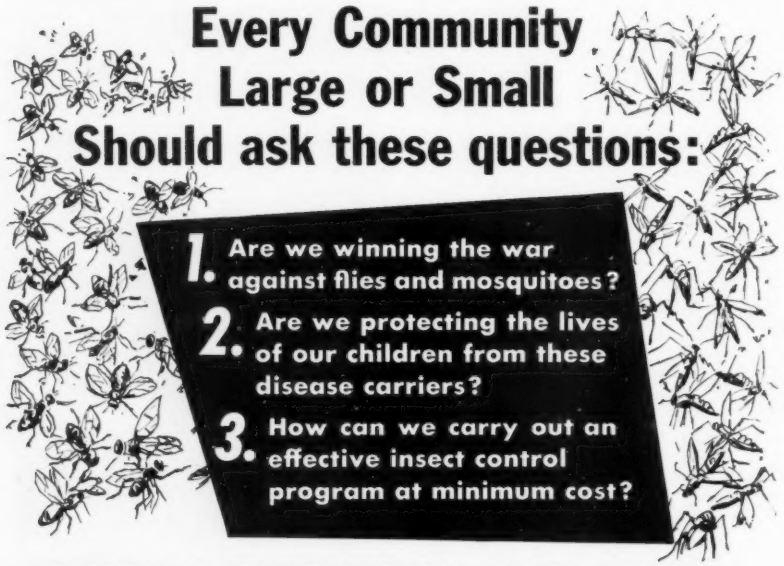
USDA Fly Control Release

"Suggestions for Fly Control in Poultry Establishments," an illustrated, seven-page report, is now available from the Insects Affecting Man and Animals Research Branch of the U. S. Department of Agriculture, Washington 25, D. C.

The booklet covers the use of dry and liquid baits, bait stations, surface sprays, space sprays, larvicides, dusts and fly cords, and includes a special chart on recommended dosages for various insecticides.


Every Community
Large or Small
Should ask these questions:
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2. Are we protecting the lives of our children from these disease carriers?
3. How can we carry out an effective insect control program at minimum cost?

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Pest Control Report to the Illinois State Fair Board

From GEORGE L. HOCKENYOS, Sentinel Laboratory, Springfield, Illinois

The following account, prepared by Mr. Hockenyos for the Illinois Fair Board, describes results of four years of pest control at its annual exposition. The editors of PC publish this report as a follow-up to a 1955 article covering a more limited phase of the program. Illustration above portrays jammed midway of the Fair during a parade.

THIS PAPER covers the period 1954 to 1957 inclusive and consists of a few general observations plus specific observations on control of flies, rodents, fleas, termites, weeds, and birds. The application of Carbola as a disinfectant and insecticide is briefly discussed.

General

Satisfactory pest control is based absolutely on adequate sanitation. If sanitation falls below a certain minimum, then satisfactory pest control becomes impossible. The type and degree of sanitation needed is discussed under the observations on specific pests.

A major problem is the cooperation of the many interests involved in an overall sanitation program. All sources of fly breeding and all sources of rat feeding must be corrected; and this correction must be done in time. In the past, dependence has been placed on cooperation of public and private interests in time to meet the sanitation requirement. This cooperation has become progressively slower each year and in 1957 was very dangerously near to the breakdown point. More positive measures of assuring cooperation in this respect are needed.

One step in this direction might be to notify in writing, two months before the opening of the Annual Fair, each agency, individual, and group of individuals involved and tell them just what cooperation is needed. Compulsion is obviously a last resort, but should be available in so far as possible, and the availability should be known. Written commitments to fulfill obligations might be well worth having.

No responsible commercial pest control oprator can risk his reputation, if he feels that his program may fail, due to causes over which he has no control.

It should be kept in mind that the chemical control of flies is a changing picture. Flies are now almost universally resistant to the chlorinated hydrocarbons and in some regions are resistant to the organic phosphates. When they become resistant to the organic phosphates in Central Illinois, the fly control problem will be due for a complete reappraisal.

The terms and terminology of the 1957 contract with the Sentinel Laboratory are satisfactory in general, but revision in two respects might be considered for 1958. One is that, since a substantial amount of weed and grass control is usually done (as well as insect and bird control), the control of weeds and grass might well be mentioned in the contract. The other is that time spent in supervision and in making inspections should be included for payment. In fact, more time spent in making inspections throughout the year might well result in economy, since infestations would be recognized and treated before they became large enough to result in a report to the pest control contractor.

Fly Control

The results of the fly control effort have been checked each year by making daily counts at from 36 to 40 counting stations. These counts serve not only to compare the effectiveness of the control program from year to year, but also serve to indicate how well control is proceeding in areas of counting stations.

The evidence from the counting stations and also general observation shows that good results have been obtained for the four-year period. The 1957 season was peculiar in that, although sanitation was not satisfactory and a great many flies reached adult status, the humid weather contributed to good control by the baiting program. Had the season been as dry as the preceding three years, control might not have been satisfactory. The fly control program is predicated on the following steps:

1. Elimination of Breeding

Fly maggots feed on many kinds of decaying organic matter. Animal manures and garbage are the chief sources at the Fair Grounds. Such materials normally decay beyond the point of fly generation in two weeks of summer weather. Hence, the importance of eliminating all new sources of garbage and manure at least two weeks before the opening of the Fair.

Each year an effort has been made to eliminate all garbage dumping on the several dumps around the Fair Grounds and also tighten up on the standards of manure removal from the grounds at least two weeks before Fair week. If garbage or any other fly breeding media is still alive a few days before the Fair, it is imperative that it be sprayed with 2-½% Lethane in fuel oil and then burned. The Lethane serves to kill the adults; and the burning stops further breeding.

Livestock trucks which are

(Advertisement)

Malathion kills resistant insects

...versatile phosphate insecticide has many applications plus low toxicity to man and animal

Every year the resistance of insects to chlorinated compounds becomes increasingly serious. Bugs now resistant include: roaches, flies, mosquitoes, fleas, lice and bed bugs. Experience has taught many pest control operators that increasing dosage or number of applications with the older materials wastes time and money.

Where resistance is a problem, organic phosphate insecticides give good control; but many of these are highly toxic to man and animal. However, one of the most effective phosphates — malathion — is *low* in toxicity to man and animals. The U. S. Public Health Service says in *Memoranda on Economic Poisons*, "... the toxicities of malathion (oral and through the skin) are less than those of DDT."

Resistant roaches

The German roach is typical of the resistance problem. A resistant strain was found in Texas in 1952. Today this strain is widespread and two hundred times as resistant to the most commonly used chlorinated hydrocarbon as normal roaches.

Malathion's low toxicity makes it ideal for roach control as well as many other pest control operations. It is recommended for use against silverfish, earwigs, flies and can be used in restaurants and food stores where highly toxic materials are prohibited.

Fly and mosquito control

Malathion kills fly maggots, mosquito larvae and the adults of both insects. All forty-eight states and the USDA recommend malathion for fly control. It gives quick knockdowns, high kills and control lasts up to four weeks.

Malathion controls practically all insects on ornamentals

Malathion — alone — kills aphids, mites, beetles, worms, scales, leafhoppers — almost every pest that attacks ornamentals. This complete control (in 1958 malathion has USDA acceptance for over 105 different insects) plus malathion's low toxicity make it ideal for estate, park, and township insect control programs.

Technical malathion is manufactured by American Cyanamid Company. For free literature, write: American Cyanamid Co., Insecticide Dept. PC 2, 30 Rockefeller Plaza, N. Y. 20, N. Y.

Jon Hockenyos, the author's son, sprays a larvicide into the rear of a livestock truck at an Illinois Fair spray station.

parked on or near the grounds must be cleaned out and the manure removed, as such cleanings are always egg or larvae infested.

Bird droppings accumulate in a few spots to the point of breeding flies, but this has not been important.

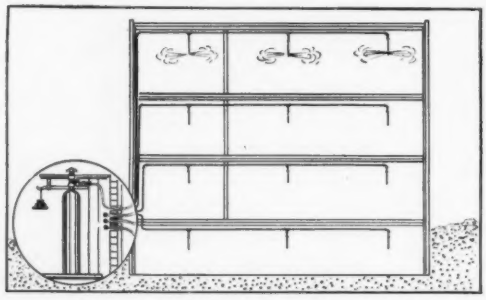
A serious problem arises each year with the post-Fair emergence of flies from the manure in the animal pens. The only answer to this seems to be in consistent daily cleaning of the pens and removal of the manure all during the Fair. In 1954 and 1955, both the Hog Barns and the Sheep Barns were heavily infested with nearly mature larvae at the end of the Fair. Since the manure was not cleaned out promptly at the end of the Fair, there was a tremendous emergence of adult flies a few days after the Fair. In 1956 and again in 1957, sodium polyborate was applied as a dry powder on the edge of the floor of each hog and sheep pen as a larvicide. In 1956, this proved to be a great help in reducing post-Fair emergence. In 1957, the hog men had done such a good job of cleaning their pens during the Fair that the sodium polyborate was probably unnecessary. By contrast, the sheep men had done such a poor job that the polyborate did not have much effect and the Sheep Barn produced clouds of flies immediately after the Fair. Sodium polyborate is no longer available, but Borax could be used in its place effectively.

Obviously, an effort should be made to provide daily—or at least every other day—cleaning of the sheep pens. If such were done, there would be no need of applying the larvicide. Larvicideing the hog and sheep pens costs about $300.00.

City alleys close to the Fair Grounds—and especially on the east and south side—contribute flies to the grounds. The City of Springfield normally collects garbage once each week. This allows time for the production of mature maggots in the garbage cans between collections. If collections in this area could be stepped up to twice each week (or even once each five days) during the Fair and for two

KILLS RATS AND MICE OVERNIGHT WITH

AEROSOL LARVACIDE THROUGH PERMANENT PIPING SYSTEM



Convenient, sure-kill fumigation. Aerosol LARVACIDE applied into any part of a building *from the outside* by means of piping system. No exposure. Simply open valve on cylinder. Economical, too. Piping system parts for 200 x 40 foot warehouse cost only about $23.00. Installation time: about two hours.

With Aerosol LARVACIDE you can fumigate an entire building by simply opening a valve.

You stop rodent damage for your industrial customer overnight . . . conveniently, quickly and economically. Just ¼ lb. of Aerosol LARVACIDE fumigates 1,000 cubic feet, driving rats out into open floor to die . . . no carcass nuisance . . . and it kills mice easier still. Later treatment, when necessary, is done at minimum cost.

LARVACIDE is available as Aerosol in cylinders . . . as flat without pressure in cylinders . . . and in 1 lb. bottles. *Make sure your serviceman carries a case of bottles in his car at all times for immediate fumigation problems.*

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INSECT CONTROL

nothing touches the

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Insecticidal Fog Generator

Weighs Just 100 lbs.

- Sold to and presently being used for insect control at industrial paper mills, peanut warehouses — U. S Air Force Bases — and Naval and Marine installations and U. S. Army camps.
- Weighs only 100 lbs., produces same or more insecticidal fog than 650 lb. and heavier machines.
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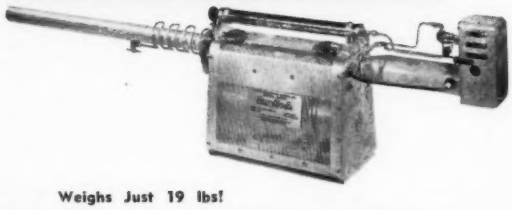

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Exclusive Saf-T-Lok® design means rugged construction. Stirrup handle for easy carry.
Welded stainless steel tank assures long lasting service, resistance to corrosive solutions.
Entire pump assembly, including cylinder, withdraws as a unit, opening bottom of funnel-shaped cam ring for easy filling. Always safe.
Drip-Not* spray control valve shuts off positively at nozzle tip of 21" brass extension. No waste!
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You apply sprayable solutions with less effort from a tank of adequate capacity for most jobs when you spray with this 2-gallon HUDSON X-Pert* P.C.O. sprayer. It fills easily, seals securely at a twist of the pump handle, pumps easily and sprays cleanly...no drippings to clean up. The pressure-safe, easy-to-open container and removable pump are easy to clean. Write for latest catalog.

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weeks before the Fair, the number of flies produced would be greatly reduced. Extra spraying of the alleys before and during the Fair reduces the adult fly population, but not production.

2. Larviciding

It is important that all livestock trucks that are to remain on or near the grounds be cleaned and then sprayed with a fly larvicide. A combination of 1% malathion and 2½% coal tar disinfectant has been used with complete satisfaction.

The same combination has been used to spray the ground at all of the spots where manure is dumped temporarily as it is brought from the barns. Some larviciding has been done around the garbage cans and other spots in city alleys near the grounds when maggots were observed.

In his report, Hockenyos emphasizes the importance of eliminating fly breeding sources. Chart at right, prepared by California Public Health Department, Bureau of Vector Control, describes these major sources and explains the kinds of flies that are attracted to them.

3. Adult Fly Control

The number of adult or winged flies on the grounds during the Fair will depend on several factors. The most important is the degree to which fly breeding has been eliminated well ahead of the annual Fair week. Another and quite important factor is the influx of flies on the thousands of head of livestock coming into the grounds at the beginning of the Fair. In addition, there is an inevitable drift of flies from up to perhaps two miles from outside the Fair Grounds.

Efforts have been concentrated on the first and most important source of flies. Little can be done about the drift of flies from a distance. Nothing has been done about the flies brought in on the livestock, but the problem has been under consideration. There are some possibilities along this line that should be explored. One possibility would be to mist the animal barns with a non-toxic spray such as Pyrethrum plus synergist as soon as all (or nearly all) of the animals have been placed in their pens. Dry fogs would not serve, but a fine mist almost certainly would give a high percentage of kill. A number of stockmen were interviewed in 1957 and the general opinion was that they would not mind having this done one time, or

THE RELATIONSHIP BETWEEN FLY PRODUCTION AND SOLID ORGANIC MATERIALS

Δ MAJOR IMPORTANCE
O MINOR IMPORTANCE

LINE NUMBER	PRODUCTIVE ACTIVITY OR OPERATION	ORGANIC WASTE INVOLVED: ANIMAL MANURE, ETC	ANIMAL OFFAL	FEED OR PLANT WASTE	PHASE OF PRODUCTION: PRIMARY OR EXTRACTIVE	HANDLING	PROCESSING	CONSUMPTION	USE OF PRODUCT OR SERVICE: HUMAN FOOD	ANIMAL FOOD	MFGD. GOODS	FERTILIZER	OTHER	DISPOSAL RESPONSIBILITY: PUBLIC	COOPERATIVE	INDIVIDUAL	NOT ACCEPTED	DISPOSAL METHOD: FURTHER USE	DESTRUCTION	RETURN TO SOIL	DUMP OR ABANDON	COMMON HEALTH PROBLEMS: FLIES	RODENTS	OTHER PESTS	NUISANCES	THE FLY PROBLEM: TYPES OF ORGANIC MATERIAL PRODUCING OR ATTRACTING FLIES	LINE NUMBER	PRINCIPAL KINDS OF FLIES PRODUCED OR ATTRACTED
	ANIMAL FARMING																												
1	CATTLE	Δ		Δ	Δ				Δ							Δ				Δ		Δ	Δ				STABLE BEDDING (E.G. CALVES) MANURE, WASTE FEED, VEGETABLE CULLS	1	MUSCA, STOMOXYS
2	SHEEP	Δ		O	Δ				Δ		Δ					Δ				Δ		O			Δ		STABLE BEDDING WHEN PENNED	2	
3	HOGS	Δ		O	Δ				Δ							Δ				Δ		Δ			O		MANURE AND SPILLED FEED	3	MUSCA
4	GARBAGE FED HOGS	Δ		Δ	Δ				Δ							Δ				O	Δ	Δ	Δ	Δ	Δ	Δ	UNEATEN GARBAGE, MANURE, SOIL CONT.	4	MUSCA, PHAENICIA, OPHYRA
5	POULTRY	Δ		Δ	Δ				Δ						O	Δ				Δ	O	Δ	O	O	O		MANURE (PENNED BIRDS) FEED SPILLAGE	5	FANNIA, MUSCA, PHAENICIA, MUSCINA
6	RABBITS	Δ		Δ	Δ				Δ						O	Δ				Δ		Δ	O		O		MANURE AND WASTE FEED	6	MUSCA
7	HORSES	Δ		O	Δ				O	Δ			Δ			Δ				Δ		Δ					MANURE (DROPPINGS), AND BEDDING	7	MUSCA, STOMOXYS
8	PETS AND EXP ANIMALS	Δ	O	Δ	Δ								Δ			Δ				O	Δ	Δ	O			Δ	MANURE AND BEDDING	8	SARCOPHAGA, PHAENICIA, MUSCA
9	FUR	Δ	Δ	Δ	Δ	Δ						Δ				Δ				O	Δ	Δ	O			Δ	MANURE, BEDDING AND MEAT FEEDING WASTE	9	PHAENICIA, MUSCA
10	FISH		Δ		Δ	Δ			Δ				Δ			Δ				O	Δ	Δ					OFFAL	10	PHAENICIA, MUSCA
	ANIMAL BY-PRODUCTS																												
11	DAIRYING	Δ		Δ	Δ				Δ							Δ				Δ	O	Δ	Δ	Δ	Δ		MANURE, VEG. CULLS, WASTE FEEDS	11	MUSCA, STOMOXYS, TUBIFERA
12	GOAT DAIRYING	Δ		O	Δ				Δ							Δ				Δ		Δ	O		Δ		MANURE, BEDDING, WASTE FEED	12	MUSCA, STOMOXYS
13	EGG PRODUCTION	Δ		Δ	Δ	Δ			Δ						O	Δ				Δ	O	Δ	O	O	Δ		MANURE FROM PENNED BIRDS AND WASTE FEED	13	FANNIA, MUSCA, PHAENICIA, MUSCINA
	ANIMAL PRODUCTS PROCESSING																												
14	MEAT AND SEAFOOD PACKING		Δ			Δ	Δ		Δ	Δ		O				Δ		Δ	O	Δ	Δ	O			O		OFFAL (SEA FOOD)	14	PHAENICIA, PHORMIA, CALLIPHORA
15	LIVESTOCK AND POULTRY SLAUGHTER	Δ	Δ	Δ		Δ	Δ		Δ	Δ	O	O				Δ		Δ	O	O	O	Δ	O	O	O		MANURE, PALNCH CONTENTS, HAIR, OFFAL	15	" " "
16	RENDERING AND HIDES		Δ				Δ			Δ	Δ	Δ				Δ		Δ	Δ			Δ	O	Δ	Δ		OFFAL, BONE PILES, HAIR, HOOVES	16	" " "
17	TANNERIES		Δ			Δ	Δ					Δ				Δ			Δ			Δ	O	O	Δ		TRIMMINGS, HAIR AND SCRAPINGS	17	" " "
18	FERTILIZER PLANTS		O				Δ						Δ			Δ		Δ				Δ			Δ		SPILLAGE AND SOIL CONTAMINATION	18	" " "
	MISCELLANEOUS ANIMAL ACTIVITIES																												
19	STOCKYARDS	Δ		Δ		Δ			Δ						O	Δ		Δ		Δ		Δ	O		Δ		INDIVIDUAL DROPPINGS, MANURE PILES AND WASTE FEED	19	MUSCA
20	RACETRACK STABLES	Δ		Δ		Δ						Δ	O	O	Δ	O		O		Δ	O	O			O		MANURE PILES AND BEDDING	20	MUSCA, STOMOXYS
21	RIDING STABLES	Δ		Δ		Δ						Δ			Δ			Δ		Δ	O	O			O		" " " "	21	" "
22	ZOOS	Δ	Δ	Δ	Δ	Δ						Δ	O		Δ		Δ	Δ	Δ	Δ	Δ	Δ	O		Δ		DROPPINGS, BEDDING, WASTE FEED	22	MUSCA, STOMOXYS, PHAENICIA, CALLIPHORA
23	ANIMAL HOSPITALS	Δ	O	O	O	Δ						Δ	Δ		Δ			O		Δ	Δ	O			Δ		DROPPINGS, BEDDING	23	MUSCA, STOMOXYS, PHAENICIA, CALLIPHORA
24	PET SHOPS	Δ	O	O	O	Δ						Δ	Δ					O		Δ	Δ	O			Δ		DROPPINGS, BEDDING, WASTE FEED	24	MUSCA, PHAENICIA, CALLIPHORA
25	PETS AT HOME	Δ				Δ						Δ				Δ	Δ	O	O	Δ	Δ		Δ	Δ			DROPPINGS WIDELY DISTRIBUTED	25	SARCOPHAGA, MUSCA, PHAENICIA
26	FISH BAIT (CUT-LIVE)		Δ		Δ	Δ	Δ				O		Δ			Δ					Δ	Δ	O		Δ		OFFAL	26	PHAENICIA, PHORMIA
	PLANT FARMING																												
27	VEGETABLE TRUCK CROP	Δ		Δ	Δ	Δ			Δ	Δ						Δ	O	O		Δ	O	Δ	O	O	O		WASTE IN FIELD, UNHARVESTED CROP AND FLY INFESTED FERTILIZER	27	DROSOPHILA, MUSCA, STOMOXYS, FANNIA
28	FIELD CROPS	O		Δ	Δ	Δ			Δ	Δ						O	Δ	O		Δ		O	Δ	O			WASTE IN FIELD, POOR STORAGE OF HAY AND GRAIN	28	STOMOXYS, MUSCA
29	FRUIT	Δ		Δ	Δ	Δ			Δ							O	Δ	O		Δ	O	Δ	Δ	Δ	Δ		FALLEN FRUIT AND FIELD CULLS	29	PHAENICIA, MUSCA
30	NUTS	Δ		Δ	Δ	Δ			Δ		O					O	Δ	O		Δ	O	Δ	Δ	Δ	Δ		FALLEN NUTS AND HULLS	30	DROSOPHILA, MUSCA, MUSCINA
31	DATES			Δ	Δ				Δ								Δ			Δ			O	Δ				31	DROSOPHILA, HIPPELATES
32	VINEYARDS	Δ		Δ	Δ				Δ		Δ					O	Δ			Δ	O	O		Δ			FLY INFESTED FERTILIZER AND FIELD CULLS	32	DROSOPHILA
33	NURSERIES	Δ		Δ	Δ	O							Δ			Δ				Δ	O	O	O				FLY INFESTED FERTILIZER AND COMPOSTING	33	MUSCA
34	MUSHROOM	Δ		Δ	Δ	Δ			Δ							Δ				Δ			Δ		Δ		FLY INFESTED FERTILIZER AND COMPOSTING	34	FUNGUS GNATS, MUSCA
35	SOIL CULTIVATION-GEN.	O		O	O				Δ	O										Δ					Δ		HIGH HUMUS CONTENT	35	HIPPELATES
	PLANT HANDLING																												
36	FRUIT AND VEGETABLE DRYING YARDS			Δ		Δ	Δ		Δ							Δ				Δ	O	O	Δ				WASTES ARE FLY ATTRACTANTS	36	DROSOPHILA, MUSCA, PHAENICIA
37	THRESHING AND SEED CLEANING			Δ		Δ	Δ		Δ	Δ			Δ			O	Δ			Δ		Δ	O	O			PILES OF WASTE LEFT IN FIELD	37	STOMOXYS
38	LANDSCAPING AND LAWN CARE	Δ		Δ	Δ	Δ							Δ	Δ		O	Δ	Δ	Δ	Δ	Δ	Δ	O	O	Δ		GRASS CLIPPINGS, COMPOSTING, FERTIL	38	MUSCA, FANNIA
39	STOCK FEED ON FARMS			Δ		Δ	Δ	Δ		Δ							Δ			O	Δ	Δ	Δ	O	O		SILO AND MILLS WASTAGE, POOR STORAGE AND HANDLING	39	MUSCA
40	FEED WAREHOUSES AND ELEVATORS			Δ		Δ	Δ		Δ	Δ						Δ			Q	Δ			Δ	Δ	Δ	Δ	FEED SPILLAGE ALLOWED TO BECOME WET	40	MUSCA
41	PUBLIC MARKETS		Δ	Δ		Δ	Δ		Δ					Δ			Δ			Δ		Δ	Δ	Δ		Δ	VEGETABLE STRIPPINGS, CULLS, ANIMAL WASTES AND SPILLAGE	41	MUSCA, PHAENICIA, DROSOPHILA
42	HOME COMPOSTING	Δ		Δ			Δ					Δ				Δ				Δ		Δ		Δ	Δ		POOR COVERAGE AND USE OF GARBAGE	42	MUSCA, STOMOXYS
	PLANT PROCESSING																												
43	FRESH FRUIT AND VEGETABLE PACKING			Δ		Δ			Δ							Δ				Δ	Δ	Δ	O	Δ	Δ		STRIPPINGS AND CULLS	43	DROSOPHILA, MUSCA, PHAENICIA
44	CANNING, PROCESSING AND DEHYDRATING			Δ				Δ	Δ							Δ				Δ	O	Δ	O	Δ	Δ		STRIPPINGS, CULLS, PULP AND SEEDS	44	" " " "
45	WINERIES			Δ		Δ	Δ				Δ					Δ				O		O	Δ		Δ	Δ	CULLS, PULP AND SEEDS	45	DROSOPHILA
46	BREWERIES			Δ			Δ				Δ					Δ				O			Δ		Δ	Δ	SPENT GRAINS	46	
47	INDUSTRIAL ALCOHOL			Δ			Δ				Δ					Δ							Δ		Δ	Δ	SPENT GRAINS AND FRUIT WASTES	47	
48	VEGETABLE OIL PLANTS			Δ			Δ				Δ					Δ				O			Δ		Δ	Δ	SPENT VEGETABLE WASTE	48	
49	FEED MILLS			Δ		Δ	Δ		Δ	Δ						Δ				O	Δ			Δ	Δ	Δ	FEED SPILLAGE ALLOWED TO BECOME WET	49	MUSCA
50	PAPER MILLS			Δ			Δ				Δ					Δ				O	O		O			Δ	BARK AND PULP LOSSES	50	
51	TEXTILE MILLS			Δ			Δ									Δ				O	O		O			Δ	SCREENINGS	51	
52	SAW MILLS			Δ		Δ	Δ				Δ					Δ				O	Δ		O			Δ	SAWDUST	52	
	MISCELLANEOUS OPERATIONS																												
53	CHEMICAL INDUSTRIES		O	Δ			Δ					Δ						Δ		Δ	O		O			Δ	WASTES	53	
54	WILDLIFE - NORMAL	Δ			O				O					O			O					Δ		Δ	O	O	ABANDONED NESTS-DEAD ANIMALS	54	PHAENICIA, SARCOPHAGA, CALLITHROA, PHORMIA, ETC
55	ANIMAL DEATHS EPIZOOTICS-DISASTER		Δ		O								Δ	O			O			O	O	O	Δ		Δ	Δ	CARCASSES-INCLUDING FISH KILLS	55	" "
56	ANIMAL DEATHS NORMAL AND FARM		Δ		O								Δ			O	O	Δ	O	O	O	Δ	Δ		Δ	Δ	CARCASSES	56	" "
57	URBAN REFUSE-GARBAGE	Δ	Δ	Δ	O	O	O	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	O	O	O	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	ORGANIC WASTES OF ALL TYPES	57	ALL COMMON SPECIES
58	VESSEL AND AIRCRAFT GARBAGE	Δ	Δ	Δ				Δ	Δ	Δ			Δ	Δ					Δ			Δ	Δ	Δ	Δ	Δ	STORAGE PROBLEMS	58	" " "
59	BEACH REFUSE FISH OFFAL	O		Δ	Δ								Δ	O		O	O					Δ		Δ	Δ	Δ	KELP AND OCCASIONAL MARINE AN.	59	GNATS, MISC. FLIES
60	MUNICIPAL SEWAGE DISP.	Δ		Δ		Δ	Δ					Δ		Δ		O	Δ	Δ	Δ	Δ	Δ	Δ		Δ	Δ		SCREENINGS, FLOATING SOLIDS AND SLUDGE	60	FILTER FLIES, MUSCA
61	INDUSTRIAL SEWAGE DIS.			Δ		Δ	Δ		Δ	Δ	Δ					Δ	Δ	Δ	Δ	Δ		Δ		Δ	Δ		" " " "	61	" " "
62	FISH WORM FARMS	Δ		Δ	Δ	Δ						Δ				Δ	O			Δ		Δ		Δ	Δ		ANIMAL MANURE USED AS WORM FEED	62	GNATS, MUSCA, POLLENIA
63	KELP FARMING			Δ	Δ	Δ	Δ				Δ					Δ	O		O		Δ			Δ	Δ		CUTTING OPERATION PRODUCES BEACH REFUSE	63	GNATS, MISC FLIES

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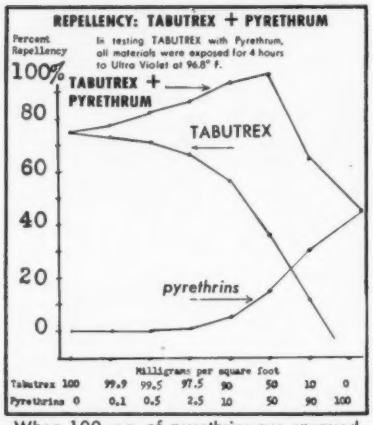

When 100 mg. of pyrethrins are sprayed on a 1 Sq. Ft. area, you get 40% repellency to houseflies. When the same amount of TABUTREX is applied to the same size area, you get 75% repellency to houseflies.

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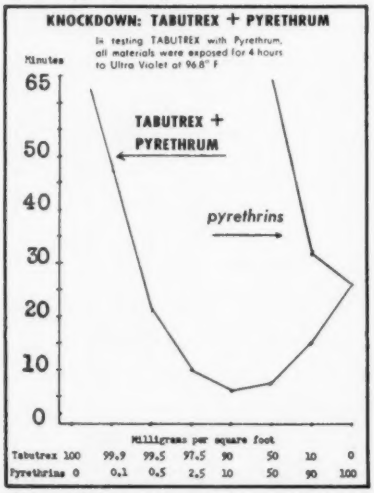

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even two times, during the Fair, but they would not like to have it done every day. A small cart-type of mist blower likely would not disturb the animals too much, but a large air-blast machine operated outside the buildings might be very objectionable.

It has been found useful to use a fine spray of Lethane 2½% in fuel oil on the manure piles at least once each day. Flies concentrate here and many can be killed daily this way.

In spite of all the measures mentioned before, there will always be a substantial number of flies that must be killed by either residual sprays, bait spray applications, or by contact sprays.

For a few years prior to 1953, DDT, lindane, and chlordane gave remarkable results as residual sprays which killed flies when they merely crawled over the sprayed surfaces. By 1953, flies were resistant to these and other sprays of the chlorinated hydrocarbon type. Control fell below a satisfactory level in 1953. In 1954, strong emphasis was placed on sanitation and malathion-sugar bait sprays were extensively used. Experiments indicated that sugar was preferable as a bait to syrups or blackstrap molasses. The formula used was 2 gallons of 50% malathion emulsion plus 40 lbs. of sugar to each 100 gallons of spray. The interior of all buildings, including toilets, barns and exhibition areas, were all sprayed within ten days of the time of the Fair. Barn entrances were resprayed during the Fair; and food concessions were sprayed daily. No general use of contact sprays was necessary except the daily spraying of manure piles.

The program used in 1954 has been followed in successive years. This program can be recommended with one qualification for the 1958 Fair season. This qualification is a very important one and merits consideration.

In the early summer of 1956, strains of flies in Denmark were observed to be resistant to malathion, Dipterex, Diazinon and other organophosphate sprays. By the fall of 1956 such strains had appeared in Southern Georgia. Although there was no evidence of resistance here in 1957, it is almost inevitable that we will have resistant flies to deal with in the not too distant future.

To date there is no new type of chemical known to be avail-

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The SANI-AIR Electric Deodorizer is guaranteed for one year, but actual experience shows there is less than ½ of 1% failure in five years continuous operation.

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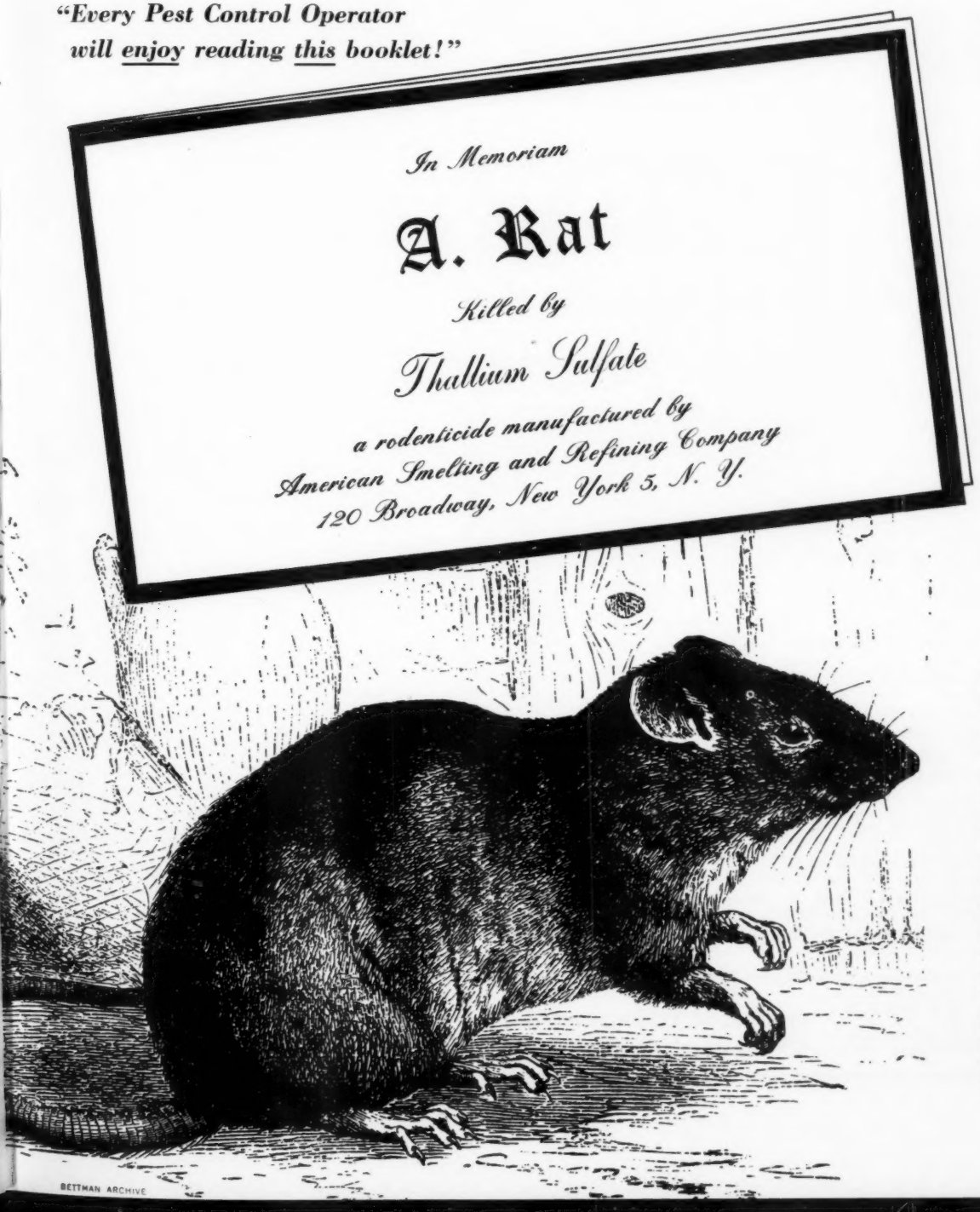

ASARCO

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able to take the place of organophosphates as a highly effective bait or residual spray for adult flies.

Thought should be given now to a program of fly control, assuming that the flies will be resistant to the organic phosphates as well as the chlorinated hydrocarbons. If a program must be designed to deal with flies resistant to both the organophosphates and chlorinated hydrocarbons, and no new type of effective chemical has been developed, then the following steps would apparently be indicated:

The most thorough possible elimination of breeding would be absolutely essential.

The use of contact sprays in mist form on the livestock would be required.

Most fly killing would have to be done with contact sprays; and since the use of large mist blowers during the day is almost out of the question, a great deal of the spraying would have to be done at night with the sprays directed onto the night-time resting places of the flies.

Food concessions would have to be misted during the day with small machines.

All of these measures would probably leave a fly population larger than existed the past four years. It might be necessary to use repellents on the serving tables and counters of the food concessions. Fortunately, there are odorless, non-toxic repellents which can be applied as a water emulsion; and tests in 1957 showed that one of them at least (Tabutrex) is highly effective.

It was found that, if counter tops were wiped with 5% Tabutrex emulsion in place of water alone, the flies were completely repelled from the surface. Only one food concession was found which had enough flies in 1957 to make a useful test; and this occurred only on the last Saturday and Sunday of the Fair. At this time one concession at the south entrance of the Sheep Barn was beginning to get flies from the accumulated manure in the sheep pens. They were emerging faster than the malathion-sugar baits could kill them and were drawn to the area of this stand. The 5% Tabutrex emulsion completely prevented their settling on the counter tops.

Repellents are effective, but should be regarded as a last resort control measure.

Rodents

The use of race horse barns throughout the year and the proximity of garbage dumps provide both harborage and food for a rat population. This problem reaches a crisis each year when the dumps are closed down before the Annual Fair to prevent fly breeding. The many rats in the dumps are thus deprived of their normal food supply and are forced to migrate in search of food.

This problem was met in 1957 by observing the behavior of the rats at the dumps; and when it became apparent that they were very hungry, they were liberally fed with poison baits. Results were excellent and no migration was observed in these particular rats.

The race horse barn operators should be urged to keep all concentrated feeds in metal containers with metal covers. Sources of water should also be kept away from the rats as much as possible. The horse men should report any evidence of rats to the Grounds office or Administrative office promptly. Prevention and prompt control measures are much cheap-

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er and more satisfactory than delayed control. A monthly check by a supervisor of the pest control firm would probably be an economical expenditure.

Fleas

A few cases of annoying infestations of fleas have occurred. In each case these have been traced to the keeping of a cat or dog in an area where dry, dusty debris made the development of flea maggots possible. Both the wetting down of debris, followed by a spraying with DDT or the application of rotenone powder have proven effective.

The keeping of pets on the grounds should not be encouraged, unless they are properly cared for. In some cases, the cause of the fleas has been a stray cat or dog which was a tolerated nuisance rather than a pet.

Termites

Some work for the control of subterranean termites has been done. This has been on a time and material basis in accordance with the Approved Reference Procedures of the National Pest Control Association, which is probably the most economical method. To do the work on a guaranteed basis would necessitate the PCO charging more for the job in order to cover the possibility of a re-treatment in the event such became necessary. It should be noted, however, that most commercial termite control is done on a guarantee basis. If a guarantee is required, then work should be let on bids.

Weed Control

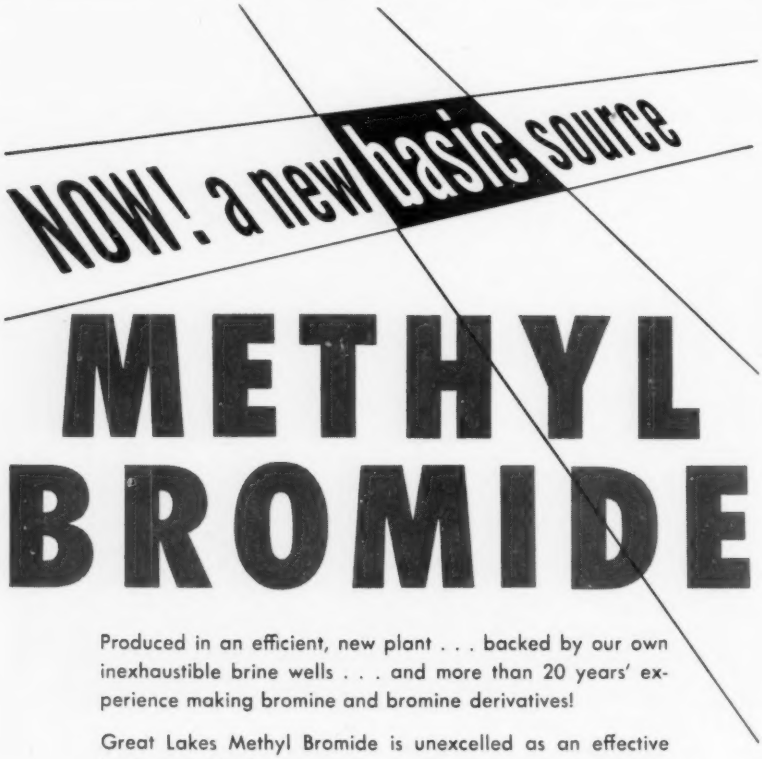
Weed control chemicals have been applied to concession areas, parking areas, and cracks in walks and drives. A check on poison ivy has been made on the entire grounds each year. The fence lines of the race tracks have also been sprayed.

Where feasible, sodium arsenite has been used. On the parking areas north of the Sheep Barn, the amount used has been held to an annual minimum due to the slight possibility of drainage of the poison into the Conservation department's wild life pools. Telvar W has been used on the concession areas because it is non-poisonous although more expensive than sodium arsenite. Sodium arsenite has been the chemical of choice on the cracks in drives and walks. No chemical was applied to the parking area west of the Junior Livestock building, as there is pronounced drainage into the Conservation area and Telvar would have been costly for the results obtained. Poison ivy has been controlled by 2-4-5-T brush killer. Based on results elsewhere, Aminotriazole is recommended for 1958; it's an exceptionally good poison ivy killer.

Bird Control

The Illinois State Fair Grounds has a serious bird problem. Not only do the roosting habits of sparrows, pigeons, and starlings result in defacement of walls, floors, and stored materials, but their nesting habits result in the production of mites, carpet beetles, and other species of scavenger insects.

Certain buildings, notably the Hog and Sheep Barns, provide such an ideal nesting site that thousands of sparrows are reared in these buildings each year. It is probable that half of all the sparrows in the north end of Springfield have been hatched



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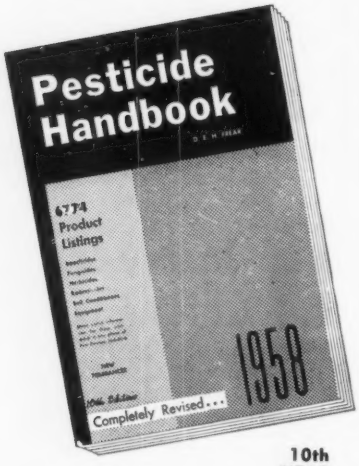

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about the editor—

Dr. Donald E. H. Frear, Editor of PESTICIDE HANDBOOK 1958, is one of the leading authorities on the chemistry of pesticides. He is the author of "Chemistry of Insecticides and Fungicides," the first book dealing with this subject published in the United States. In addition, he has written several other books, including "Chemistry of Insecticides, Fungicides, and Herbicides." Dr. Frear is Professor of Agricultural and Biological Chemistry at The Pennsylvania State University.

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STATE COLLEGE, PENNSYLVANIA

in either of these two buildings.

There is not one bird problem at the Fair Grounds, but a series of problems, based on the types of buildings and species of birds involved. Similarly, there is no one quick economical solution to the problem.

The most desirable control, where feasible, is some form of permanent reconstruction of the building. For example, the Poultry Building provides both a roosting site for a great many starlings and sparrows and also the chief nesting site for pigeons. Most of the pigeon nests are in an old gutter which is part of the main building on the south side. A lean-to addition was apparently built on to the main building and covers the now unneeded gutter. Simply removing the gutter would eliminate the major roosting area of the entire grounds. Better yet, the entire building could be enclosed with chicken netting to eliminate all nesting and roosting.

In the Hog and Sheep Barns, there are two ledges with a recessed space above each row of pens. These are not suited to pigeons, but are ideal for sparrows to nest in, and they do so in great numbers. These recesses could be blocked out with very light panel material and the roosting problem permanently solved. On the west side of the Hog Barn, there is a shelf or ledge close to the ceiling which is heavily used by nesting pigeons. This could be readily screened off at little cost.

As an interim measure, the nesting site ledges of the Hog and Sheep Barns were sprayed in 1956 and 1957. A high pressure sprayer with a solid stream nozzle was used; and the entire ledge space was flooded with 10% coal tar disinfectant (Coopers Milk Dip Oil). Both years spraying was started about May 1 and repeated at ten-day intervals for about two months. The spray served to destroy all eggs and young birds. Nests would be rebuilt after a few days; hence the need for repeated spraying during the main nesting season from about May 1 to about July 1. No sparrows were reared in these buildings and there was a great reduction in the number of sparrows roosting in the buildings in the fall and winter of 1956.

Although very effective as an interim measure, this procedure

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FUMARIN®-22

(Dry Bait)

Here's why this highly effective anticoagulant is used—and reused—as the preferred dry-bait concentrate by leading PCO's throughout the country:

- *Controls both rats and mice*
- *No bait shyness*
- *No tolerance build-up*
- *No prebaiting necessary*
- *Reduced hazard*
- *Maximum acceptability*

Economical—*always*
Safe—*anywhere*
Effective—*any time*

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or write us for details

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Ambler, Pa.

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NOW—TO GIVE YOU EXTRA PROFITS DURING YOUR HOTTEST SELLING SEASON

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LETHALAIRE®

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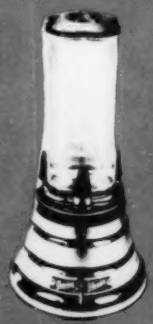
NO LOSERS! EVERYBODY WINS!

BIG PRIZES FOR GETTING NEW LETHALAIRE CUSTOMERS!

Complete Polaroid Highlander Land Camera Kit—Retail, $109.95—Value 327 points



Waring 2-Speed Chrome Blender
Retail, $44.95—Value 100 points

Philco Portable TV
Retail, $179.95—Value 515 points

See the next page for more exciting prizes you can win in the sensational Lethalaire 'Bombs Away' Sales Race!

MAKE THE NEW LETHALAIRE®

'BOMB
SA

HERE'S HOW TO DO IT!

Contest begins April 15 and ends August 1

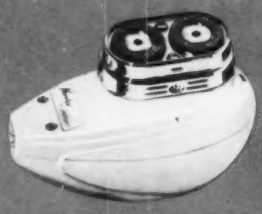
Enter the contest
Simply send a letter or postcard saying "Enter me in your 'Bombs Away' Sales Race." Address it to Lethalaire Division, Virginia Smelting Company, West Norfolk, Va. Include your name and home address, company name and address.

Start selling Lethalaire to new customers
Only sales to *new* customers (who are not now using Lethalaire) can help you win prizes. No credit is given on bombs sold to present Lethalaire users.

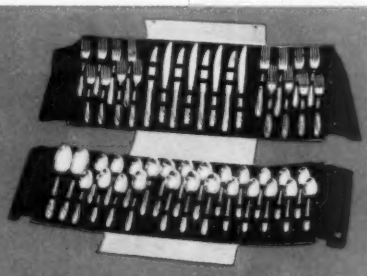
Keep track of your sales and number of units sold
When you enter the contest we will send you a supply of 'Bombs Away' Sales Race Tally Cards. Each time you make a "new customer" sale, enter it on your tally card, together with the number of new units sold to him.

Each bomb has a point value
To make it easy for you to keep track of your

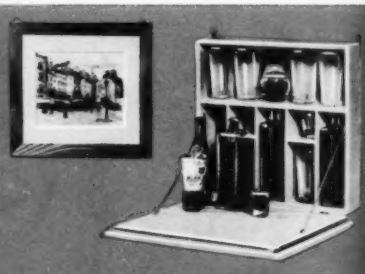
HERE ARE MORE BIG PRIZES YOU CAN WIN IN THE BIG LETHALAIR



Norelco Speedshaver
(man's or woman's)
Retail, $24.95—Value 54 points



80 Piece Stainless Steel Flatware Set
Retail, $19.95—Value 45 points



Picture Bar
Retail, $20—Value 45 points

All Chrome Wall Ice Crusher
Retail, $9.95—Value 24 points

Mary Proctor Champion Iron
Retail, $10.95—Value 25 points

Musical Jewel Box
Retail, $9.95—Value 24 points
Choice of ivory, aqua or rose

S AWAY' ALES RACE

PAY YOU BIG DIVIDENDS

progress toward the prize you choose, we have given point values to the Lethalaire bombs as follows:

2½- lb. unit—½ point
5- lb. unit—1 point
30-lb. unit—6 points

Each prize has a point value

Each prize listed on these pages has its point value shown. Simply select the prize you want and then sell Lethalaire bombs to new customers until you have accumulated a number of points equal to the value of your prize.

Have tally cards signed and send them to us

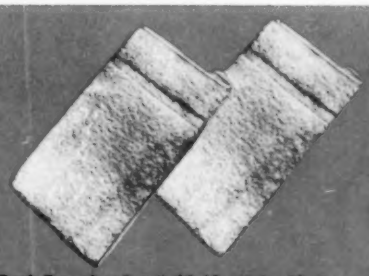
When your tally cards show you have earned enough points to win your prize, have a responsible executive of your company (sales manager, vice president, president, etc.) attest the accuracy of your cards by signing them. Then mail them to Lethalaire Division, Virginia Smelting Company, West Norfolk, Va., and your prize will be forwarded to you as soon as your tally cards have been checked.

THAT'S ALL THERE IS TO IT!

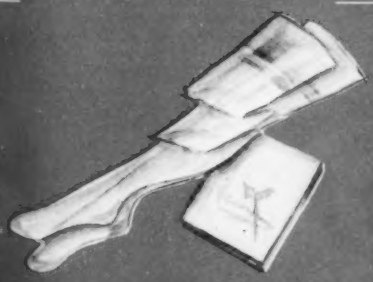
E 'BOMBS AWAY' SALES RACE! No limit to how many prizes you can win!

Drink N'Chip Server
Retail, $6.00—Value 14 points

Timex Viscount Self-Winding Watch
Retail, $16.45—Value 37 points

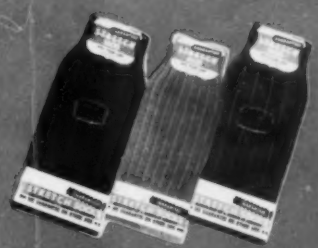


Bath Towels—Retail, $3.60—Value 10 pts.
Set of 2. Choice of Blush Pink, Seafoam Green, Sunglo Yellow, or White



Gotham Gold Stripe Nylon Stretch Hose
Retail, $4.05—Value 10 points—Box of 3 pr.
Choice of beige or taupe.
Sizes: petite, average, tall

Man's Gabardine Sport Shirt
Retail, $4.95—Value 14 points. Choice of blue, tan, grey, or green. Sizes: S-M-L-XL



Men's Wool & Nylon Stretch Socks
Retail, $4.50—Value 11 points
Box of 3 pr. in assorted colors

SELL THE LETHALAIRE® METHOD

See how easy it is to increase your income and win valuable prizes, too! Here's why selling Lethalaire is easy!

30-lb. container (refillable) | 5-lb. container (refillable) | 2½-lb. throwaway bomb

LETHALAIRE IS

More effective—Here's fly control you can really brag about! Knocks down flies fast—virtually 100% kill every time. Flies never develop resistance to it. Also kills fruit flies, mosquitoes, wasps, gnats and fleas.

More economical—A big talking point! Show your prospect he can treat 1000 cu. ft. of space in 3 seconds for just a penny. The 5-lb. container is the equivalent of 10-12 gal. of ordinary fly spray.

A safe, clean insecticide—No residue or oily film after using—no messy liquids to pour or spill—no fire or explosion hazard—no objectionable or dangerous chemicals—completely harmless to warm-blooded animals. Safe even around food and food products.

Easily demonstrated—No expensive sprayers or heavy equipment to lug about with you. Just turn the knob for a second or two and let the prospect see how Lethalaire knocks flies down for keeps.

A real "repeater"—You only have to sell a customer Lethalaire once—from then on you just fill his repeat orders. Here's a fast, easy way to build up your "repeat" business!

AND LETHALAIRE NATIONAL ADVERTISING IN THESE IMPORTANT MAGAZINES IS OUT TO DEVELOP SALES LEADS FOR YOU!

Here's the kind of advertising that puts money in your pocket! This year's entire Lethalaire advertising campaign has been carefully tailored to develop inquiries. As fast as they come in, they will be forwarded to the nearest Lethalaire outlets. These will be inquiries from firms interested in Lethalaire—they will make red-hot sales leads you can follow up!

VIRGINIA® Chemicals

LETHALAIRE DIVISION • **VIRGINIA SMELTING COMPANY** • WEST NORFOLK, VIRGINIA

D79—Form 501
3-58

Printed in U.S.A.

is costly. About $480 worth of coal tar disinfectant and $120 in labor were used each year. In the long run, mechanical alterations would probably be much cheaper.

Poisoning birds is illegal, but with special permission of the Conservation Department, some poisoning experiments were conducted. In one test, some 25 gallons of dead sparrows were picked up. This quantity made little difference in the apparent population and the birds quickly became bait-shy. Very few pigeons or starlings were killed. Poisoning is not an indicated means of control at the Fair Grounds. The possibility of adverse public opinion alone makes it inadvisable.

In certain areas the use of sticky repellent materials is definitely indicated. These materials are applied by means of a caulking gun to the roosting and nesting sites. The birds are not harmed, but avoid treated places. Such material was applied to several heavily occupied areas in 1956 and 1957 with excellent results. These applications are not permanent. Permanent methods should be used, where feasible, but there are considerable areas where the sticky repellents may well be the most practical means of control.

Carbola Spraying

Carbola is a trade-named product consisting of a white inert powder with a small amount of phenol as a germ killer and a small amount of both lindane and malathion as insecticides. It is widely used in commercial dairy barns.

In 1956, the Hog Barn was sprayed with Carbola. The improvement in appearance and odor was commented on by numerous people. Fly control was enhanced, although the posts and outer walls were also sprayed with malathion and sugar as a bait.

In 1957, the Hog Barn was again sprayed with a lighter application; and the Sheep Barn was given a heavy application by spraying. There was no question about the improvement in appearance. A check taken among the leading sheep exhibitors revealed no objections to the application. A similar check among the hog men revealed the surprising fact that, while the breeders of dark colored hogs had no objection to the application, there were a number of white hog exhibitors who objected to the Carbola on the ground that they believed it caused serious skin irritation on the underparts of their animals. Some objected to any application; and others said a light application such as made in 1957, was not so bad as the heavy application made in 1956.

There is a possibility that the sodium polyborate used in the pens as a dry larvicide may have contributed to the claimed difficulty. Since only light annual applications of the Carbola are needed to keep the pens looking clean and fresh, it might be well to consider such applications and at the same time discontinue the borate powder application, so long as the hog men continue to do a good job of daily cleaning of their pens, which obviates the need for the borate.

ECONOMICAL RAT JIGGER* CAN'T TIP, CAN'T LEAK, SAYS 'POISON' ALL OVER IT!

Spill-proof! Exclusive flared skirt construction prevents container from tipping, even if rat or mouse steps on rim! Holds ⅓ ounce.
Leak-proof! Tests show: no seepage after 18 days, thanks to strong, seamless, one-piece construction.
Absolutely safe! Unmistakable skull and crossbones warning signals, word POISON printed in large capital letters, all over!
Easy to handle! Saves you time, and it's economical, too. Prices only $5.62/1000 for lots 5000 to 25000.

Tested and approved! Rat Jigger* Rodenticide Container meets all the rigid specifications of Federal Agencies and the N.P.C.A. Sets standard for quality and safety as incorporated in Standard Safe Handling Procedure for Compound 1080 and other liquid poisons. Order with coupon. Packed 5000/case.

Prices through your distributor

1-5M	@ 6.75M plus PP
5M-15M	@ 5.62M plus freight
20M or over	@ 5.62M freight prepaid

Universal Paper Products Company, 380 Lexington Avenue, New York 17, New York
Please ship through nearest distributor: _____ No. 1080 RAT JIGGER
(Cases-5000 each)
Rodenticide Containers @ _____ per M $_____
(See prices above)
NAME _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____
SIGNED _____

*T.M. Pat. Pend.

Infestation Report

Contains pertinent portions of the Department of Agriculture's **Cooperative Economic Report**, materials from university entomology departments and reports from readers. PCOs noticing infestations in their own areas are urged to communicate with **Pest Control** so their information may be added to this infestation report.

BOXELDER BUG
(Leptocoris trivittatus)

Maryland: Entering house and causing annoyance in Baltimore. **Utah:** Troublesome in homes at Kanab, Kane County. Also causing some annoyance in other counties.

CLOVER MITE
(Bryobia praetiosa complex)

Idaho: Active in and around dwelling in Moscow area, Latah County. **New Mexico:** Eggs on apple trees in many orchards in San Juan, Sandoval, Rio Arriba, Santa Fe, Valencia, and Bernalillo Counties. Invading homes throughout state. **Nevada:** Causing increased annoyance to homeowners in Reno - Sparks area, Washoe County. **Oklahoma:** Severe infestation in dwelling Oklahoma City, Oklahoma County. **Utah:** Causing annoyance in several areas of state. **Virginia:** Heavy in school, Appomattox County.

COCKROACHES

California: Blattella vaga infesting a house in Oakdale, Stanislaus County. Not a common species in state. **Georgia:** Joint infestation of Supella supellectilium and Blattella germanica of units in large apartment house in Atlanta, Fulton County. A report Periplaneta fuliginosa infested a home in De Kalb County. **Utah:** Seriously infesting apartment building in Brigham City.

IMPORTED FIRE ANT
(Solenopsis saevissima richteri)

Alabama: Blount, Fayette, Shelby Counties report first infestations. Treatments applied to heavily infested section of highway north of Montgomery. **Florida:** Leon County reports first infestation. Twelve nurseries treated in Hillsborough county and 130 acres in Marion County. Adults collected at Paxton, and at three different areas near Liberty. Both locations in Walton County. **Georgia:** Dooly, Marion, Miller, and Laurens Counties report initial infestations. Laurens County infestations will cover about 350 acres. Other infestations light. In Decatur County, 12,208 acres treated by airplane. **Maryland:** None found on 214 acres surveyed in Howard County. **North Carolina:** Local infestations in Brunswick and Mecklenburg Counties, both on sites of previously eradicated infestations. Treatments applied to new finds. **South Carolina:** Initial infestations reported in Berkeley and Marion Counties. **Texas:** Three new infested counties —Liberty, Harris, and Tyler.

MOSQUITOES

California: Heavy infestation of Anopheles freeborni annoying residents in cities along Sacramento River from Redding to Sacramento. These hibernating females were brought out by heavy rains followed by warm days, but will go back into hibernation upon return of cool weather. Warm weather and heavy rains causing unusually early break in hibernation. **Nevada:** Survey of major breeding areas east of Pitman and Whitney, Clark County, revealed numerous egg rafts and larvae.

PAVEMENT ANT
(Tetramorium caespitum)

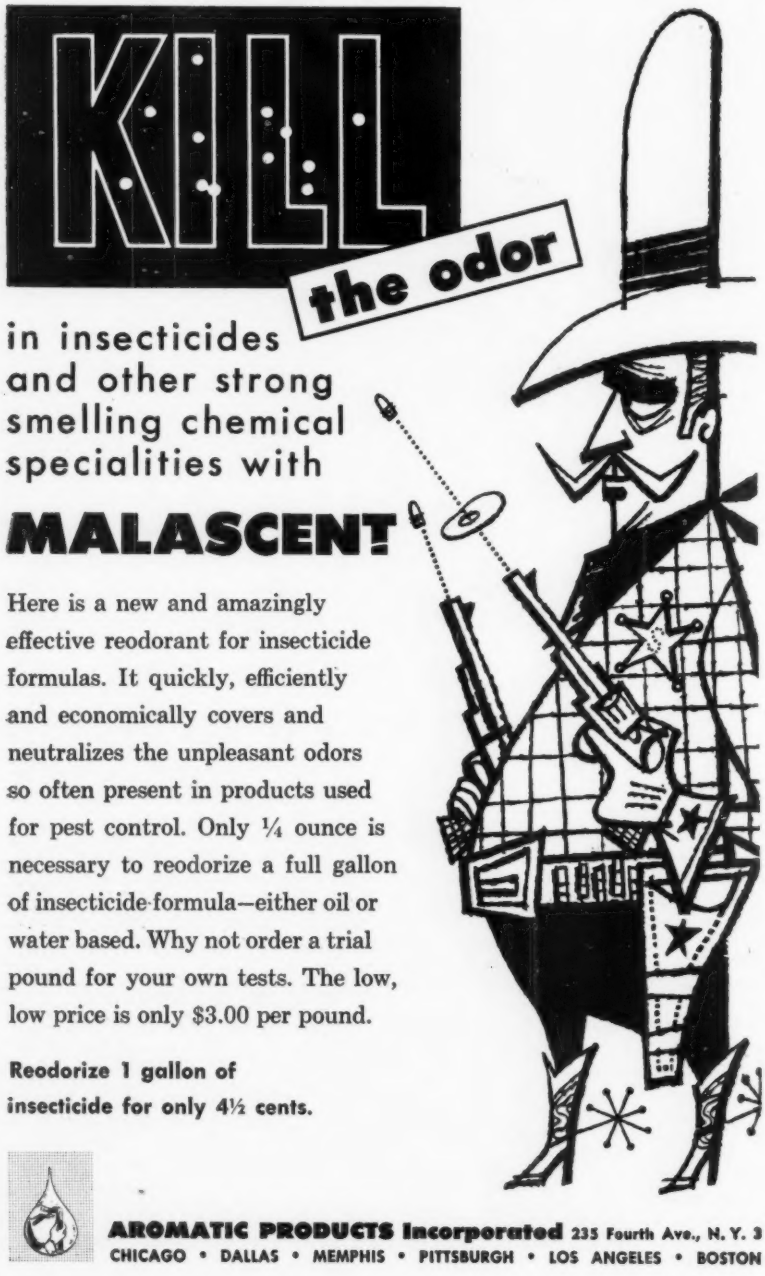
Georgia: Large numbers invading homes, De Kalb and Fulton Counties.

POWDER POST BEETLES

California: Lyctus brunneus heavily infesting bamboo blinds in house in Oakland, Alameda County. **North Carolina:** L. planicollis emerging from hardwood floors, Caldwell County. **Virginia:** Heavily damaged wood in two-year-old upholstered chair in Portsmouth, Norfolk County.

TERMITES

California: Specimens of Cryptotermes brevis taken from plywood of folding chairs packed in crates from Hawaiian Islands and stored in warehouse at Sacramento. This insect does considerable damage in Hawaiian Islands and, although is not known to occur in California, could possibly exist in parts of state. Specimens of Coptotermes formosanus also found in same shipment. **Nevada:** Reproductive forms of Reticulitermes sp. swarming in Reno-Sparks area, Washoe County. **North Carolina:** Reticulitermes flavipes late forms emerging in a home, Mecklenburg County.



in insecticides and other strong smelling chemical specialities with

MALASCENT

Here is a new and amazingly effective reodorant for insecticide formulas. It quickly, efficiently and economically covers and neutralizes the unpleasant odors so often present in products used for pest control. Only ¼ ounce is necessary to reodorize a full gallon of insecticide formula—either oil or water based. Why not order a trial pound for your own tests. The low, low price is only $3.00 per pound.

Reodorize 1 gallon of insecticide for only 4½ cents.

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NOW! Cowles

DIETHYLTOLUAMIDE
(DETAMIDE 95)

Cowles is now on stream with the U. S. Army Quartermaster and Department of Agriculture discovery diethyltoluamide, claimed by scientists to be the best repellent yet for mosquitos, flies, chiggers and ticks.

Cowles DETAMIDE 95 (minimum assay meta isomer—95%) is in production now.

Cowles DETAMIDE 85 (minimum assay meta isomer—85%) will be available soon.

Highly resistant to perspiration and normal wear-off, Cowles DETAMIDE is a colorless liquid with a pleasant cosmetic fragrance.

Full technical information and prices upon letterhead request.

DETAMIDE 95 is packed in 5 gal. and 55 gal. drums—available one drum to a carload.

Cowles

ORGANIC CHEMICAL DEPARTMENT

CHEMICAL COMPANY

Cleveland 3, Ohio

Some PCOs' Business Off In Wake of Country's Economic Decline, PC Survey Reveals

"Last year we had one of our best years in business, but all of a sudden, particularly in January, the bottom seemed to drop out of our market."

That's what one large Baltimore, Md. pest control operator told PC field reporters in a business survey among PCOs last month to determine how the country's current economic recession is affecting this industry. Nearly 65% of the operators polled complained of a business lag, and over 30% felt it had reached "serious" proportions.

Apparently the fall-off in collections and business from neighborhood restaurants and bars is typical of the small account that's causing PCOs the most trouble. Slim pay envelopes are keeping people home in front of their TV sets at nights now. As a result, many small taverns and eating establishments have lost most of their regular customers, and are being forced out of business. Some PCOs claim restaurants they service have changed hands as many as seven to eight times in the last year. This means the advantages of regular service must be re-sold to the same restaurant that many times in order for the PCO to retain the account.

"Our business was way off during fall and winter," Maurice Oser of Denver, Colorado's Oser Exterminating Co., said. "This is the first time in years we've experienced a business slump in those seasons. Unlike pest control business in most other Midwestern states, our's in the Denver area usually picks up in the winter since drywood termites are as active here in January as in April. That's why we can usually count on good business in January."

Another Midwesterner, J. E. Penland of Orkin Exterminating Co., Inc., Dodge City, Kans., says collections are his big problem: "We are really getting concerned, and in many cases we are obtaining definite statements of intent to pay from customers before we agree to do their work."

To follow up February's Business section article on credit extension ("Let's Look At Our Credit Policies," page 44), PC's editors spot-checked the current state of business within the industry. Results of this special survey are reported here. — Ed.

Similar reports from the Midwest prompted Topeka, Kansas' Henry Hastings of Perma-Blitz Termite Control, secretary of the Kansas Termite and Pest Control Association, to circulate a business questionnaire among the association's membership recently. Seventy-five percent of the respondents wrote they are having collection difficulties.

"My own books indicate," Hastings says, "that during one monthly billing period, less than 40% of my clients who received statements paid up. It's all part of the tight economic picture we're seeing today. Many other operators have indicated their concern, and others are beginning to give a long, hard look at the credit picture."

Even operators whose over-all volume appears unaffected by the national economic picture report some disturbing overtones in their business. By late January, D. C. Scott, Tri-State Exterminating Co., Wichita, Kans., had a backlog of six termite jobs and business was as good as it had been in years, but even he admitted some of the accounts were getting harder to collect than before.

Shifting to the New England area, Jud Pestana, J. P. Chemical Co., Milford, N.H., says the economic tightness in his section of the country has been largely of a local nature.

"A big textile manufacturer moved his plant out of our city not long ago," Pestana relates. "That, of course, threw many people out of work, and small shopowners that lost business from these former textile workers also began having trouble. Gradually all businesses, large and small, were affected. The city's business slump was finally corrected when town leaders began attracting diversified industry to Milford, such as those manufacturing shoes, plastics, etc."

On the West Coast, PCOs aren't without their business troubles, but population growth and other factors have helped modify the squeeze.

"About 50% of a termite operator's work in California is in connection with real estate transactions," Wayne K. Davis, Ailing House Termite Inspection Bureau, Oakland, Calif., says. "And on that basis, the money for the termite inspection or correction may be held in escrow for the operator — but at least it's there."

Davis claims companies that feel the business pinch worst are the ones which operate on a marginal basis and cut their prices so low that a 10% dip in business can get them into serious difficulties.

"The pest control industry will probably always be vulnerable to conditions of this nature," he added. "When the country experiences a business recession, pest control services are one of the first and easiest expenses a homeowner or small business can cut out. We have a lot of trouble with Argentine fire ants in California. Say the cost for servicing an ant job is $2.50 a month. That's an easy expense for the homeowner to cut, and likely one of the first that he will."

What can operators do about

THIS MAN USES

1080®

(ACTIVE INGREDIENT SODIUM MONO-FLUOROACETATE)

THE MOST EFFECTIVE RODENTICIDE KNOWN

Available to experienced professional exterminators

TULL CHEMICAL CO.

The potency of 1080® is dependent upon its sodium monofluoroacetate content — the most active of all sodium fluoroacetate salts.

Containers: 8 oz. Cans — 1 pound, 12½ pound, 25 pound boxes
½ oz. Cans — ½ pound, 1 pound, 4 pound boxes
Shipment Made by Railway Express

TECHNICAL BULLETIN AND PRICE LIST AVAILABLE UPON REQUEST

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OXFORD, ALABAMA

it? Apparently there's very little.

In the Midwest farm belt where prosperity is largely attuned to the farm economy and where money shortages do exist, many feel all the operator can do is wait out the problem and concentrate on delinquent accounts. Collection of these accounts would be a welcome stopgap, of course, but PCOs in Kansas, Nebraska, and Colorado are divided over the question of whether tardy accounts should be turned over to collection agencies. Some operators fear such action will cost them the client; others argue the account will have to be crossed off their books anyway.

"Conservative New Englanders still wince at the thought of admitting they have 'bugs' and would never permit a labeled PCO truck to pull up in front of their houses," Pestana says. "This makes our selling job tougher under normal economic conditions, let alone when money is tight. To show you how far people in our area will go, folks here are inclined to think termites don't exist in the cold Northeast. A few contractors still talk about what they call 'cases of wood rot' and 'a lot of little white things' in the wood, but they won't admit the existence of termites, even when we show them termite-riddled timbers taken from homes and commercial buildings that were badly infested.

"Anybody home? . . . "

"To combat this attitude, our company is working on a public relations program to better acquaint the public with pest control problems and what we, as qualified pest control operators, can do for them. At a home show that ran several days last year, we had an exhibit which easily drew one of the largest over-all crowds of the whole show. This proves we can reach the public, stimulate their interest . . . and, of course, broaden our market. Just because business is down, we can't stop selling. Instead, we've got to sell harder than ever."

That's probably the key to most recession problems—"sell harder than ever."

Release Accounting Leaflet

Sound accounting procedures for partnership management are covered in a new leaflet, "Basic Accounting for Small Partnerships," Number 29. It can be obtained from any of the Small Business Administration's offices or the SBA's headquarters in the Lafayette Building, Washington, D. C.

You're Missing A Beaut --- If

you haven't added **Swingfog** to your arsenal of Insect Fighting Equipment. Why? Because **Swingfog,** the only Portable Pulse Jet Fogger **and** Sprayer available, can help you out of the toughest control problems you've ever faced. You will do jobs faster, better and more economically any time you tackle them with **Swingfog.** Outdoors it will be simple for you to control mosquitoes, flies, midges and mites, wasps and bees, using **Swingfog.** Indoors, in supermarkets, restaurants, food plants, box cars and flour mills, use **Swingfog** to eliminate roaches, silverfish, moths and beetles, adults and larvae, by fogging or residual spraying — or both, if needed.

SWINGFOG MACHINES, SERVICE AND PARTS CAN BE OBTAINED FROM:

Tifa Sales Company, Wheaton, Illinois

Research Products, Kansas City, Missouri

Van-Wan Fog Equipment & Supply, Portland, Oregon

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Wood-Destroying Organisms: Part Two

Diagnosing Causes of Wood Deterioration

by IRA HATFIELD

Director of Research
Wood Treating Chemicals Co., St. Louis, Missouri

This is Number Two of a three-part, bi-monthly series which began in the February issue of PC. The first article outlined composition and structure of wood. The final installment, to be published in June, will be on control products, their selection, methods of application, and results to be expected. —Ed.

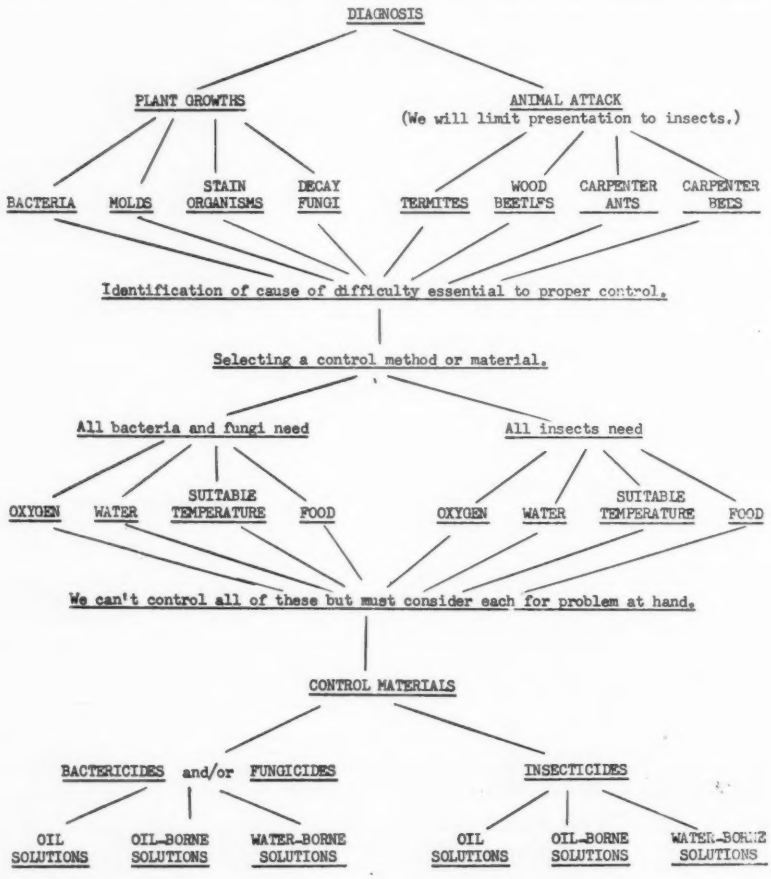
If the PCO is to do an intelligent job of diagnosing the cause of wood deterioration, he must be familiar with the agents that can cause the destruction of wood. Our discussion will not consider weathering, fire, or other such destructive agencies, nor will we cover action by marine organisms that can deteriorate dock piling, boats or other marine items. Neither will we discuss destruction by rodents. Rather, we will limit our presentation to the common plants (fungi) and animal organisms (insects) most frequently encountered in pest control activities.

PLANT GROWTHS

Let us first discuss plant growths. Bacteria are usually of little consequence except when moisture conditions are such that bacteria can multiply rapidly. Then they can cause "sour" or other odors that are offensive to householders. If conditions are favorable for bacterial growth, a much worse condition probably exists, namely, that moisture conditions are suitable for the growth of fungi. These fungi may be molds, stain producing fungi, or decay producing fungi.

Molds

You are all familiar with molds —the bluish molds that grow on oranges, the black or green molds that grow on bread, or molds that get on leather or other items in damp basements. Molds growing on wood are often referred to as **superficial** molds. That's because they usually derive their food from extraneous portions of wood; i.e., from the minerals that make up the nutrient plant-food elements of trees and from the extractives which also are foods. In other words, these organisms do not derive their nourishment from the structural part of the wood (cellulose or lignin), but rather from the starches, fats, resins, oils and minerals that are within the wood cells. Molds usually appear as more or less superficial growths on the surfaces of the wood or wood composition materials, and may make the wood unsightly because of their dusty or colored growths. They may also impart an odor that is referred to as a musty or moldy odor. Since these molds are superficial, the control treatment can also be somewhat superficial, i. e., the product used to control them does not have to penetrate deeply into the wood to give relief from the problem. A good fungicide properly applied will usually clear up the trouble, but, of course, since the presence of excessive moisture almost always contributes to the growth of molds, you should help the client find ways to eliminate the excessive moisture problem either by providing adequate ventilation, repairing leaks (water



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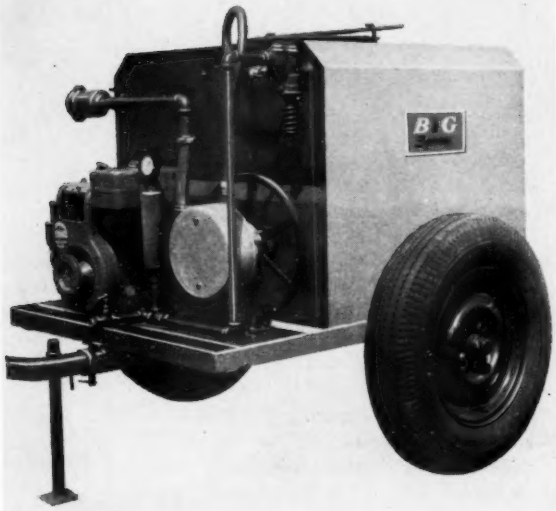

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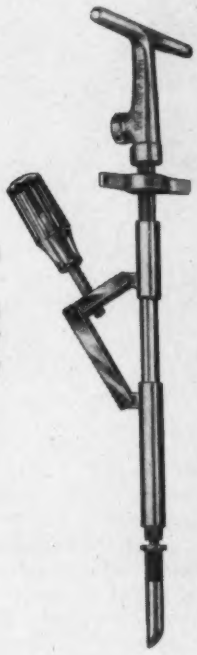

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Fig. 3.—Blue stain fungus growth in unprotected wood is pictured above as it appeared on a corner section of a window screen.

pipes, down spouts, etc.), or in other appropriate manners.

To help diagnose problems relating to molds, we might say that there are three different types that are quite commonly identifiable. In very wet sites one may find a superficial (surface) growth that is yellowish-green to greenish-white in color. This organism will probably belong to the genus **Trichoderma.** The spores of this organism are borne in terminal clusters on many branched hyphae. **Trichoderma sp.** is common on new wood that has been allowed to remain wet, or on wood surfaces that get excessive condensation, for this organism requires considerably more moisture for active growth than the other two molds we will mention.

Another group of molds belongs to the genus **Penicillium.** Often the specie name describes the color, for **Penicillium lateum** is more or less of yellow color, **P. rubrum** is red, **P. glaucum** is a greenish hue, etc. These molds have distinctive "spore-heads" which look like a broom with bead-like straws.

The third group of molds we will describe belongs to the genus **Aspergillus.** A very common member or specie is **Aspergillus niger,** so called because the "spore-heads" are a very dark brown to black color. The spore-heads are usually knob-shaped with bead-like chains of spores attached around the circumference of the knob.

Stain Producing Fungi

In direct contrast to these more or less superficial molds that show up on the surface of the wood and give color because of the color of the spore-heads, there is another group of fungi that are not rotters or decay organisms, but which do penetrate in and through the sapwood of boards and other wood items. They are known as blue stain or sap stain organisms. They are not of a superficial nature although the spores usually do appear on the wood surfaces. As the mycelium (the thread-like portions of the fungus) grows through the wood, it gives the area attacked a bluish color due to the fact that the mycelium is colored rather than being colorless as is usually the case with the more superficial molds (**Penicillium, Aspergillus, Trichoderma).** The hyphae or mycelium of these organisms grows through the cementing areas between the cells, but does not use the fibrous material for food. (Figure 3). These organisms depend largely upon the soluble or semisoluble materials within the wood cells to act as their food source, and grow through the wood ray cells, imparting a bluish color to the wood. All blue stain fungi require considerable moisture for their growth, hence if it was possible to control excessive moisture, it would be possible to control these stain organisms. Usually these stain problems occur in such a way or under conditions about which you can do little or nothing, but you should know the difference between molds and stain organisms. Of most importance to you and your potential client is the fact that although these organisms do not weaken the wood, the conditions of moisture that make their growth possible also are favorable to the growth of decay organisms that do deteriorate (rot) the wood.

Decay Producing Organisms

Usually problems of wood rot or wood decay are of greater importance to the householder than the problem of molds. Almost everyone has seen plenty of decay: — porch steps, bottoms of door jambs, possibly joists in unexcavated areas, or even in roofs where adequate ventilation has not been provided. Decay organisms actually use the structural portions of the wood for food. and, therefore, the decomposition they cause makes the wood either less suitable for structural purposes, or renders it completely unfit if the decay is highly advanced. In most cases that will be called to the PCO's attention, any superficial evidence of decay will be visible either as fan-like white or brown appearances (mycelium) on the wood (Figure 4) or protuberances known as fruiting bodies (Figure 5). Wood that has started to decay badly will have an appearance in accordance

Fig. 4.—Mycelial growth of decay organisms, in various stages, is shown here in a photograph of timber cross sections. (Both photos on this page, courtesy U. S. Forest Service.)

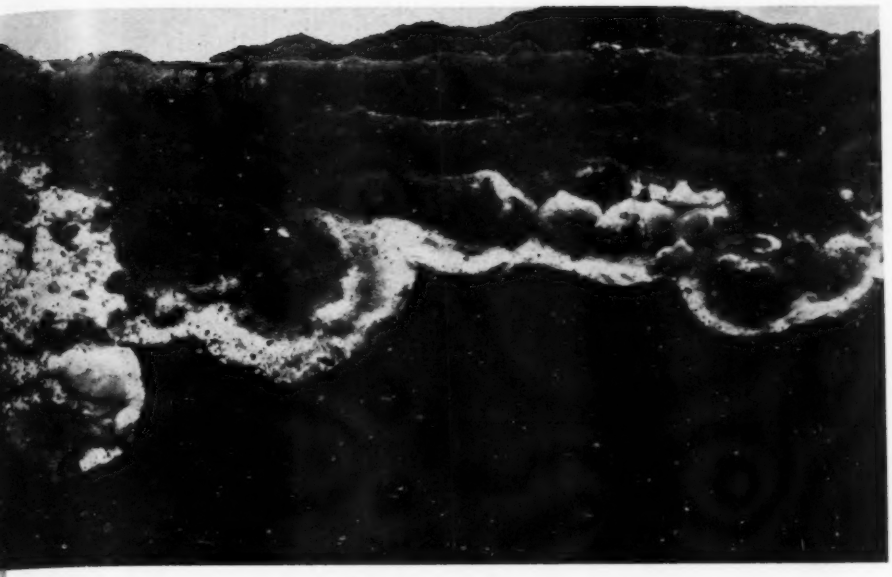

Fig. 5.—Fruiting bodies of one kind of decaying organism are growing on this section of wood. (Photo, courtesy U.S. Forest Service).

with the type of organism involved. Some of the decay organisms attack chiefly the lignin and are known as the white rots. These rots usually discolor the wood even in their early stages of growth. The rot they produce in the wood is categorized either as a white mottled, white cubical, white spongy or white pocket rot.

The decay organisms that attack chiefly the cellulose are known as brown rots. They too are classified as brown mottled, brown pocket, brown stringy, brown spongy and brown cubical rots. Many of the "dry rot" organisms (an incorrect term because all rot organisms require moisture to grow) belong to the brown rots, and because the badly decayed wood breaks up into cubes and is dry and powdery, these rots fall into the brown cubical rot class.

These descriptions of brown or white rots are based on the appearance of the decayed wood. Each rot has a special type of fruiting body, and although you may seldom see them, they are most helpful in aiding the mycologist in the identification of the causal organism. These fruiting bodies protrude from the wood surface, and may be "toad-stool" shaped, or appear as brackets or shelves (Figure 5).

The fan-like mycelium that forms on wood is often seen in inadequately ventilated roof or attic areas, on joists and subfloors in poorly ventilated unexcavated areas or on the under side of porch steps or porch floors or other places that can stay moist for long periods of time or for prolonged intermittent periods.

In this case the fungi which are called rot organisms are not superficial, they grow into the wood and actually use the cellulose or lignin for food. Thus as they destroy these fibrous and cementing products, they weaken the wood. The treatment you use to control these organisms must not be superficial. The chemicals used must penetrate deeply into the wood if you are to control the decay causing organisms, and of course, the product used must be an effective fungicide, capable of killing this type of fungus.

Having discussed superficial molds and the deeper growing decay organisms, let us see what all of these organisms need in order to grow. They are plants, and like all plants they need food, water, oxygen and a suitable temperature for proper growth. If any of these could be eliminated or modified sufficiently, the fungi couldn't grow. You can't do much about the oxygen in and around wood, so mark that off. If the wood stays wet, you might be able to suggest ways to keep it dry such as putting ventilators in unexcavated areas, opening up around porches by removing shrubbery, removing vines from walls, repairing down spouts, or by other effective methods. But the chief way that you can help control these organisms is by doing something to the food supply of the organisms. Since all wood contains cellulose, lignin, and extractives that could serve as food for fungi, the main way you can modify that food supply is to poison it. This you do with chemicals that act as fungicides, and these control chemicals will be discussed later.

INSECTS

We will now leave the plant or fungus part of our discussion for a bit, and go over to the animal or insect phase of the subject. Although there are a large number of wood inhabiting and wood eating insects, in general the PCO in the United States is called upon to handle problems dealing with the control of subterranean termites and of wood borers belonging to the Order Coleoptera. In this latter group fall the powder post beetles and the bark beetles.

Subterranean Termites

You will recall that we stated that fungi need food, water, oxygen, and a suitable temperature for their development. The same goes for these insects. Let us, therefore, turn our attention first to the subterranean termites. About the only contribution our

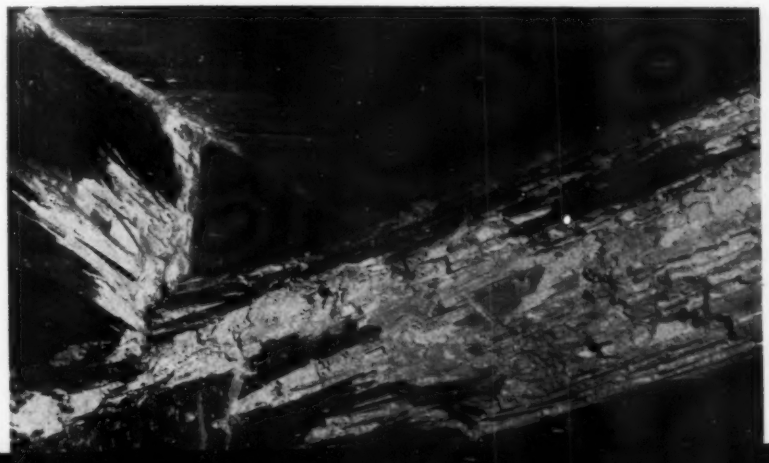

Fig. 6.—Sub-termite damaged timbers, as illustrated right, were photographed in Atlanta, Ga. by the Orkin Exterminating Co.

civilization has made to the temperature relations of termites is to provide conditions where they can work all the year around instead of only in the warmer months. The change from the wood or coal burning stove to an around the clock heating of houses in winter has been a boon to termites. We also have helped provide adequate water supply through our construction methods, our desire to keep the lawn green as many months as possible, our planting of vines, shrubs, and other ornamentals close to the house, etc. There appears always to be enough oxygen present, so control measures again boil down primarily to what we can do to the wood so that the insects cannot eat it.

It should be unnecessary in this presentation to give a pictorial presentation of termites, how they work and of the damage they do. Their tube building activities, as well as the destruction they can do to structures (Figure 6), is well known to the PCO and often to the home owner after a heart-breaking experience.

The National Pest Control Association furnished valuable leads for subterranean termite control work when it established its 1, 2, 3, 3½ methods of control and when it set up its Approved Reference Procedures (ARP), but we have arrived at a place where our termite control activities require knowledge well beyond only that of soil treatment. We no longer should think of **a** method of termite control, but use **every** method that is economically feasible for preventing their damage. Certainly protection of the wood is one such method.

Sometimes there appears to be a conflict between the PCO's approach to termite control and what the wood preserving industry advocates. There really need be no antagonism, for soil poisoning as a method of pre-treating soil is both logical and sensible, but so is the use of commercially pressure treated wood in at least load-bearing and other vulnerable portions of the substructure of a building.

As we come to this point, we see what on the surface appears to be a conflict between the PCO's approach to giving BRAB and the FHA an answer to the problem of termite control by the use of soil treatments and what the wood preservation interests have said about both decay and termite control **in wood.** Yet there really is no conflict in these two approaches. Let us analyze what has been said so that we will be in a position to discuss this intelligently.

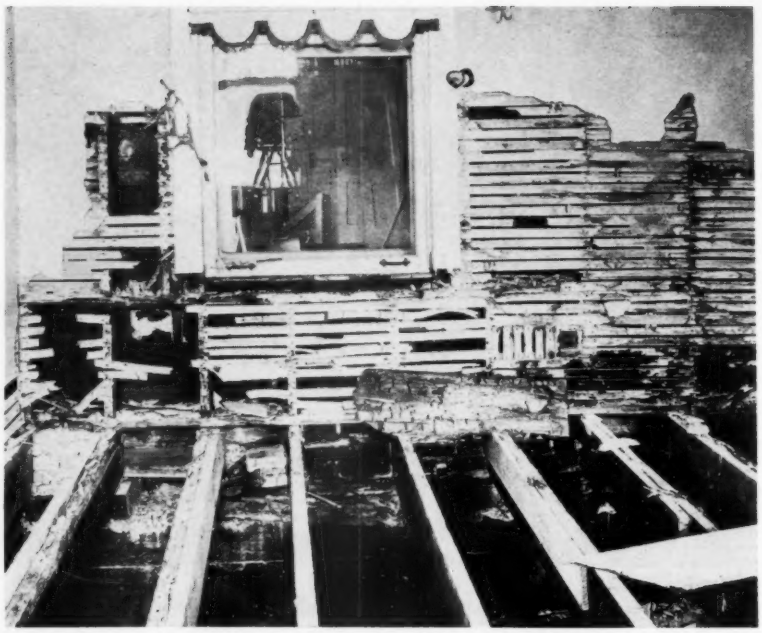

Fig. 7.—Extensive termite damage was apparent in the studs, wall plates, and other portions of the wall of the home pictured here. This infested residence was photographed in Georgia.

The American Wood Preservers Institute, in their survey report entitled "How to Prevent Decay and Termite Damage in Houses" (Feb. 1956) stated that where the incidence of decay and termite attack was heavy, plates and sills on top of masonry foundations of outside walls, furring strips on masonry walls, frames of basement windows, outdoor steps, columns, exposed porch lumber, and fences should make use of properly pressure treated wood. Those recommendations were for houses having a basement. For crawl space houses, they added girders, joists, and subfloors as well as frames leading to crawl spaces. For slab-on-ground construction, they named such wood items as sills, plates, and sleepers or nailers in contact with the concrete slab or masonry, all studding resting on sills or plates in contact with the concrete, and exposed steps, columns, porch lumber, and fences.

The various construction items named above are also the ones you are or should be interested in protecting and should be a part of your story even though you use soil poisons or other auxiliary types of control. For the wood preserving industry to so specify should not be at odds with the termite control industry. These conditions of using pressure treated wood can be met only in new construction or when repairs are made to old structures, and you should be interested in sponsoring such requirements whether you are acting as a consultant or are in a position to use such wood in the repair work you may do.

When it is adequately recognized that improper construction practices can contribute immensely to real estate losses from decay or from termites (**Figure 7**) or from both, and when it is recognized that proper pre-treatment of the soil and of the wood can greatly reduce these losses, it becomes a matter of education to get these ideas across.

Let us now turn our attention to wood inhabiting beetles. As in the case of termites, we won't be able to control the oxygen, the temperature, or do too much about the moisture content of the wood, so our interest will again be turned to what we can do to make the wood unattractive as food for the beetles. In recent years, we have been getting more and more inquiries about wood inhabiting beetles other than the powder post beetles, so I want to

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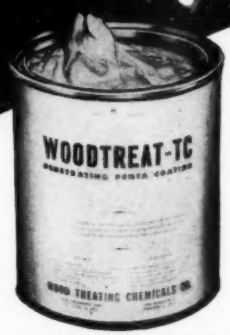

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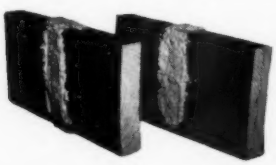

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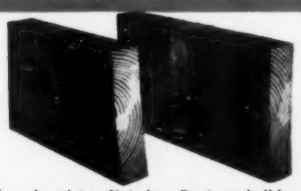
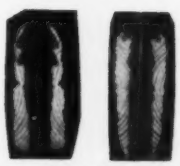


Four days later. Note how Penta and oil have penetrated from point of application to end of board. Dried residue is almost ready to flake off or be brushed off.



Cross sections of boards at point of application. Note the very deep penetration of Penta in just 4 days!

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WOOD TREATING

Fig. 8.—Bark beetle galleries are easily distinguishable in this section of a tree from which the bark has been removed. Wood Treating's Hatfield cautions that such galleries and bore holes in lumber should not be confused with the work of other types of wood-destroying beetles.

divide this phase of the presentation into two parts, namely, the bark beetles and the powder post beetles.

Bark Beetles

Off hand, you might wonder why we want to discuss bark beetles — sounds like we propose to think about tree inhabiting beetles. Actually, we are "next door" to doing that very thing, for the insects we are going to talk about come into the wood while it is still in the logs or at least while the wood is relatively new and green.

More and more you may be seeing floor joists or studs or subflooring with a portion of the wood containing some bark. The lumberman calls that **wane.** When such wood is green (unseasoned) the bark beetles or sawyers can get started in the wood, and they can live in the wood for quite some time unless the wood is kiln dried (put through a steam and heat process) or unless it is preservative treated with chemicals that will render the wood unfit for food for these insects. In houses, these beetles can be a nuisance until they emerge and leave the wood, but they will not re-infest the wood because it will usually dry out too much. Removal of the bark will help a lot, and insecticides can be applied if desired. We will also come to that point later.

Identification of the causal insect is extremely important, for control measures may be entirely different than for powder post beetles. If you pull some of the bark off the wood and find gallery engravings on the inside of the bark and on the wood which was next to the bark, you can be almost 100% sure bark beetles are the cause of the complaint. (Figure 8). Their galleries do not penetrate the wood like powder post beetle galleries, and the wood fibers or "sawdust" that may be found in the galleries is usually composed of some of the reddish-brown bark. While we are discussing bark beetles and before we get serious about some of the other wood borers, we might comment on some of the Cerambycid beetles that lay their eggs in the bark of wood, but the larvae work in the wood, sometimes for prolonged periods even after the wood has been used for construction purposes. These belong to the longhorn beetle group. Their chief interest, so far as PCOs are concerned, lies in the fact that the householder may be bothered with the work of the larvae for a while, but the timbers in the house are not re-infested by the adult beetles.

Fig. 9.—Powder post beetle frass clinging to the surface of these badly infested floor joists is evidence of heavy gnawing activity inside the timbers. Frass is larval refuse or excrement.

Powder Post Beetles

This brings us to a general discussion of the powder post beetles. Whereas the bark beetles use the wood beneath the bark primarily as a place to rear their young and do a relatively small amount of damage to the wood proper, the powder post beetles lay their eggs in the pores of the bark or more often in the pores of the wood, and the larvae that hatch from the eggs use the wood for food. In this case they are after the starches in the wood, and it has been demonstrated that the amount or rate of attack

on wood by powder post beetles is in direct proportion to the starch content of the wood. Here again, you have no control over that point, so all you can do is poison the wood so that the starch can't be utilized as food.

Although a description of the various powder post beetles and of the types of damage they do to wood would be interesting, it is beyond the scope of this paper to go into this phase of the problem. One picture showing frass on infested floor joists is shown in Figure 9. The reader is directed to the bibliography (at the end of Part 3, scheduled for June) where specific reference material will be listed relative to powder post beetles.

We will pass over carpenter ants and carpenter bees lightly, not because they are unimportant, for they can and do cause considerable damage to wood, but because they use wood as a home rather than for food, and information is available on how to combat them. In general, control measures could be classed as superficial, for localized treatments either with an ant poison or with a dust or volatile insecticide usually suffice.

CONTROL MATERIALS

Having given this quick survey of the subject of fungi and insects that inhabit wood, we will next consider what fungicides and insecticides are available to the PCO concerned with controlling decay or insects in or on wood.

You are familiar with the fact that materials used to control bacteria are called bactericides, those used to control fungi are called fungicides, and those used to control insects are called insecticides. In the realm of bactericides and fungicides, we find that the materials fall chiefly into three classes, namely, oil solutions, oil-borne solutions, and water-borne solutions. Since we are dealing in this presentation with organisms that grow in or on wood, it would be outside the realm of this paper to discuss bactericides for restaurant dishwashing use or bactericides for sterilizing dairy equipment, to give only two examples. In fact, in most cases where wood is concerned, if the PCO will control fungi, the bactericidal problems on wood will automatically be cleared up.

Fungicides

Considering the control of fungi in wood, the two chief oil solutions utilized today are creosote and creosote coal-tar solutions. Without detracting from their value as wood preservatives, it can be stated that wood treated with these products is not of too great interest to PCOs, because of the odor of the products. Seldom can wood treated with these products be used in homes because of the lingering odor that would be unacceptable to the householder. In commercial applications, however, there are places where their use would be satisfactory.

The two chief oil-borne solutions available either as solutions for application by the PCO or in the form of commercially pressure treated wood, are pentachlorophenol solutions and copper naphthenate solutions. Of these two, pentachlorophenol has been far more widely used than copper naphthenate. There are many forms in which penta solu-

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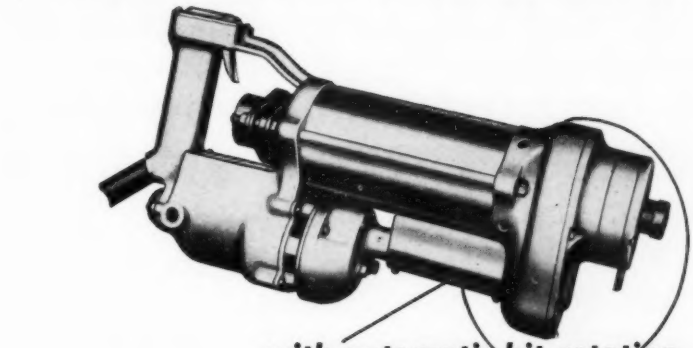

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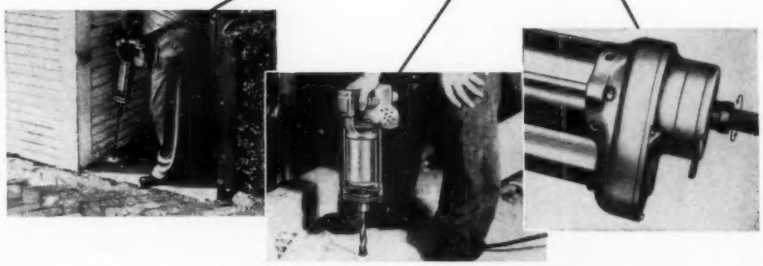

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tions are available on the market, ranging from essentially colorless and odorless solutions to the bodied emulsions used where it is desirable to get a considerable loading of preservative in a single application to wood already in place. Although the light colored and relatively odorless penta pressure treated wood is not always commercially available from all lumber dealers, it is very satisfactory for new construction as well as for replacing damaged wood in already existing structures. It is better for the PCO to treat wood used for repairs by immersion processes than to utilize untreated wood if pressure treated wood cannot be procured. The value of the penta treatments lies in the fact that proper treatment renders the wood resistant not only to molds and decay fungi, but also to insect attack.

Although water-borne preservatives can impart decay resistance to wood and several of the preservatives in this class may also serve as termite deterrents, they generally should not be applied by the PCO. This is because they are effective only if put into the wood by commercial pressure processes, and because the wood needs to dry thoroughly after treatment and before use. The use of water solutions on wood in existing structures can cause serious problems of warping, checking, and other undesirable features.

Commercially pressure treated lumber is available from local lumber dealers in some areas. Such treated wood is usually named according to the preservative used. For instance, wood treated with Wolman salts is usually called Wolmanized lumber; that treated with chromated zinc chloride is referred to as CZC treated wood; that treated with copperized chromated zinc is Cr CZC treated wood; etc. At the present time, the American Wood-Preservers' Association has standards for Celcure, Chemonite, Greensalt, Boliden salt, chromated zinc chloride, copperized chromated zinc chloride and Wolman salts. As lumber dealers see the value of carrying stocks of lumber treated with one or more of these products, these names will become better known by the PCO and the general public.

Insecticides

Insecticides fall into six classes, although only three important ones are shown on the outline. We will discuss the three shown on the outline, and then cover the other three. Because of the many products available in each class, we cannot possibly mention them all. Therefore, we will select only illustrative products, it being understood that those chosen were chosen only as illustrative and not because they are necessarily better than certain other products.

Oil solutions are insecticides that are oily liquids as manufactured and before formulation. Creosote would again be representative of this type and is effective against termites. Chlordane would be another example. It is an insecticide, but not a fungicide so far as its use on wood is concerned. Furthermore, if it was to be considered for the treatment of wood, it should be formulated with oil rather than with water.

In the class of oil-borne (oil

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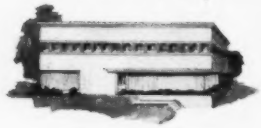
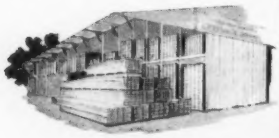
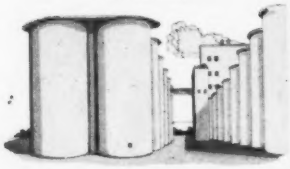


BUILDINGS



LUMBER



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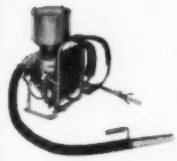
304—Thoro-Spray* Electric Sprayer

3 qt. stainless steel tank, automatic time switch, dual purpose nozzle for residual or atomized mist spray. Includes extra 4-jet Atomist* spray head for greater kill of flying insects. Will handle any liquid insecticide, disinfectant or deodorant. Discharges about 1 oz. per minute.

231—Continuous Sprayer

A general purpose continuous sprayer with new "Adjusto" nozzle for fog or coarse spray. Patented Nu-Power pump, 1½" x 13", 1 qt. heavy tinplate container. Double seamed and leakproof. 1¼" opening for easy filling. Especially recommended for resale.



4601—Nap-Sak* Power Duster

Portable power duster with 2 h.p. two cycle gas engine, rewind starter. One and two outlet models. Weight 42 lbs. empty, 67 lbs. filled. Finger-tip engine and discharge control allows precision application at high volume and high speed over large areas. Aluminum hopper, fan and fan case. Welded tubular steel frame. 2" O.D. dust tube. Mistattachmentavailableasaccessory.

903 PRO*—Chemical Duster

A dust applicator of proved performance for effective kill of burrowing pests. Powerful pump provides high volume air blast, high penetration. Aluminum container holds one pound of dust. Cut-off features permit dispersal of air-dust mixture or air only. Clip fixes handle for carrying. Hose ¾" dia. by 3 ft. long. Pump is 14" x 3¾".

276S—Seal-Tight* Sprayer

4 gallon capacity, corrosion-resistant stainless steel tank, with exclusive Seal-tight locking cover and electrically welded seams. Easy stroking 1¾" x 15½" seamless brass pump. 42" oil and chemical-resistant hose, rotatable shut-off, 24" brass extension with exclusive Revolvo* nozzle that turns full circle.

63030—Spraycat* Power Sprayer

30 gallon tank with single piston pump that has new spring-loaded poppet valve with nylon discs and seats, extremely tough, almost wearproof against agricultural chemicals. New Jet-O-Matic* agitation. Handles all sprayable solutions. Available, gasoline or electric powered models. Rolls easily on pneumatic tires. Other models from 15 to 150 gal. capacity.

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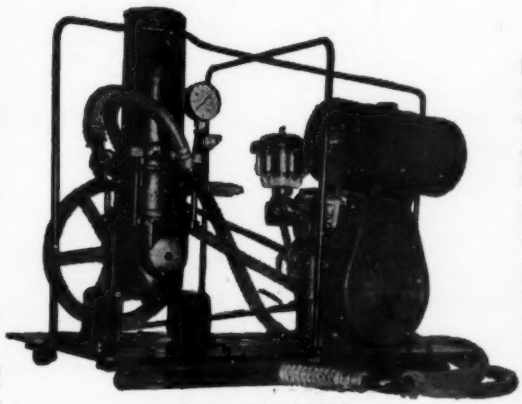

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soluble) insecticides, there are many representatives. Four examples of such oil-borne insecticides used in connection with either termite, powder post beetle or carpenter ant control are DDT, dieldrin, lindane (or benzene hexachloride), and pentachlorophenol. Each may have its place depending upon the end use, but where the combined qualities of a fungicide and insecticide are needed, only pentachlorophenol will qualify.

Just as in the case of fungicides, we could again name Celcure, Chemonite, Greensalt, Boliden salt, etc. as types of water-borne solutions used for insect control in wood. Those products that contain arsenic, copper, or chromium appear to have more insecticidal value than those water-borne materials that do not contain one of these products.

The three other classes of insecticides are gases, dusts, and emulsions. It is known that such gases as cyanide gas, methyl chloride, methyl bromide, and ethylene dibromide can kill insects and insect larvae in wood, provided the gas can be held in contact with the wood long enough to penetrate the galleries. Recent development in lightweight plastic tarpaulins has simplified putting such a gas-containing "envelope" over entire structures so that fumigations can be satisfactorily carried out. An inherent draw-back to such treatments compared to certain other types of wood preservatives is that these gas treatments can kill the insects, but they do not render the wood immune to new re-infestations.

Dusts containing DDT, dieldrin, sodium fluoride, arsenic trioxide, etc., have been used to dust galleries of dry wood termites, carpenter ants, and carpenter bees. Satisfaction so far as control with these dusts is concerned, is based on the assumption that some of the insects get the dust on them and carry the dust to the colony "headquarters" where it will either cause the colony to be annihilated or cause the colony to move away from the particular area being treated.

Actually, little need be said about emulsions for the treatment of wood to control insects, for in general the penetration of water solutions will not be good, and the water will also tend to be detrimental to the wood in place in the structure. The only reason for putting emulsions in this discussion is that some PCOs have bought emulsifiable materials with the idea that if they wanted to produce emulsions they could, but if they wanted to apply oil solutions, all they would have to do is "cut" the concentrate with oil instead of water. This may sound like a good way of reducing basic inventory, but it is not economical from the standpoint of the finished product when oils are used as the diluent, and the final solutions can exhibit sludging, foaming or other characteristics that are undesirable and may cause grief far outweighing what were supposed to be advantages.

This brings us to the subject of application of products — their selection, methods of application and the results to be expected. This will be presented as Part 3 of this paper, to be published in June.

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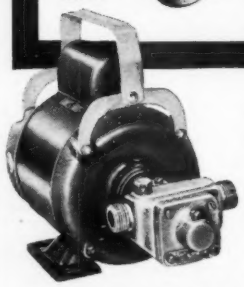
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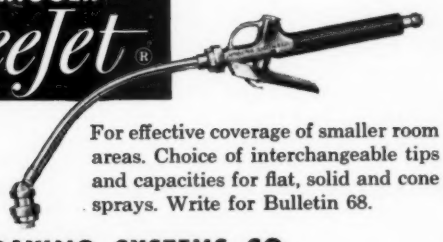

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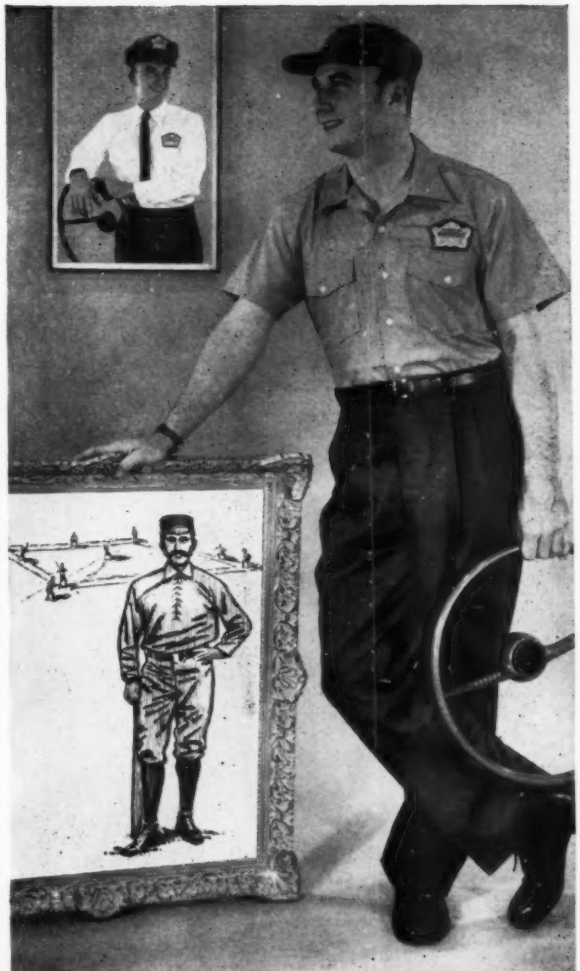

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What's NEWS In The Industry

Soil Solidification Talks Spark PCO Program at Penn. State University Conference March 4-6

A discussion of soil solidification and waterproofing, a new experimental concept in soil pest control, keynoted the program at the 12th annual Pennsylvania State University Pest Control Operators Conference March 4-6 in State College, Pa.

Herbert L. Parsons of American Cyanamid Co., Bound Brook, N. J., described developmental work underway by American Cyanamid with AM-9, a new chemical used to harden soil masses as a pest and moisture deterrent. Parsons told PC after the conference that extensive publicity on AM-9 as a termite and soil pest barrier will be withheld until results of further testing have been evaluated conclusively.

Alex Ehrlich, J. C. Ehrlich Co., Lancaster, Pa., suggested AM-9 might be used as a moisture barrier on termite jobs where a leaky foundation wall might otherwise result in frequent water seepage that would dilute chemicals. Ehrlich said he has successfully used AM-9 in experimental quantities to keep muskrats from penetrating the bank of a pond. Their digging had caused heavy water run-off.

Other key talks at the conference were heard from Dr. Ralph E. Heal, executive secretary of the National Pest Control Association, and the university's R. G. Kokat, R. H. Wherry, M. R. Swartz, E. L. Cooper, and J. O. Pepper. Harry Katz, Elco Manufacturing Co., Pittsburgh, Pa., was moderator at a special discussion covering various industry problems.

Canadian Conference Program

Roaches, Oriental fruit moth control, and restaurant sanitation head the list of speakers' topics scheduled for the 16th annual conference of the Canadian Pest Control Operators Association April 17-19.

Slated for Queen's University in Kingston, Ontario, the conference will feature addresses by Dr. Philip J. Spear, technical director of the National Pest Control Association; Drs. A. S. West, G. A. Harrower, and J. R. Vallentyne, all of Queen's University; Dr. W. S.Ward, Department of Sanitation, Toronto; Professor R. H. Ozburn, Ontario Agricultural College; M. H. Hutchison; Montreal; Dr. H.A.U. Monro, London, Ontario; and W. N. Keenan, Plant Protection Division, Ottawa.

Donald W. Sanderson, secretary of the Canadian PCO Association, suggested hotel reservations be obtained at either the Fort Henry Hotel at 205 Princess, or at the LaSalle Hotel, Bagot, both in Kingston. For more information, write Sanderson at 464 Dawes Rd., Toronto 16, Ontario.

Seek Ban On Phone Listings Offering Free Inspections

A move to persuade telephone companies in California to refuse PCO directory advertising in which "free" inspectons are offered has been undertaken by directors of Pest Control Operators of California, Inc.

At a recent meeting in Covina, Calif., board members voted to send a letter to California telephone companies requesting rejection of such advertising because, members claimed:

"**1.** (It) infers that an owner will get a free inspection report, which is generally not true.

"**2.** So-called 'free inspections' tend to lead to the following situations:

- **a.** Not enough time is spent to make an adequate inspection.
- **b.** Operators that don't write reports have no legal responsibility.
- **c.** Costs incurred in 'free ininspections' have to be loaded on to jobs sold.
- **d.** In some cases, operators offering free inspections 'manufacture' work, and exaggerate conditions and costs.
- **e.** These operations lead to high pressure selling.
- **f.** Escrow companies and brokers believe it is not necessary to pay inspection fees."

Int'l. Congress Registration

Registration blanks and copies of the program for the International Pest Control Operators Congress, scheduled for May 14-18 in Vienna, Austria, are available now from Professor Emeritus J. J. Davis, Department of Entomology, Purdue University, Lafayette, Ind.

Bill Ives Promoted

H. William Ives has been appointed assistant district manager of Rose Exterminator Co., Detroit, Mich. He is a member of the safety committee of the National Pest Control Association and vice president of the Wolverine Pest Control Association. Ives is a graduate of Kalamazoo College and has done graduate work at the University of Wisconsin.

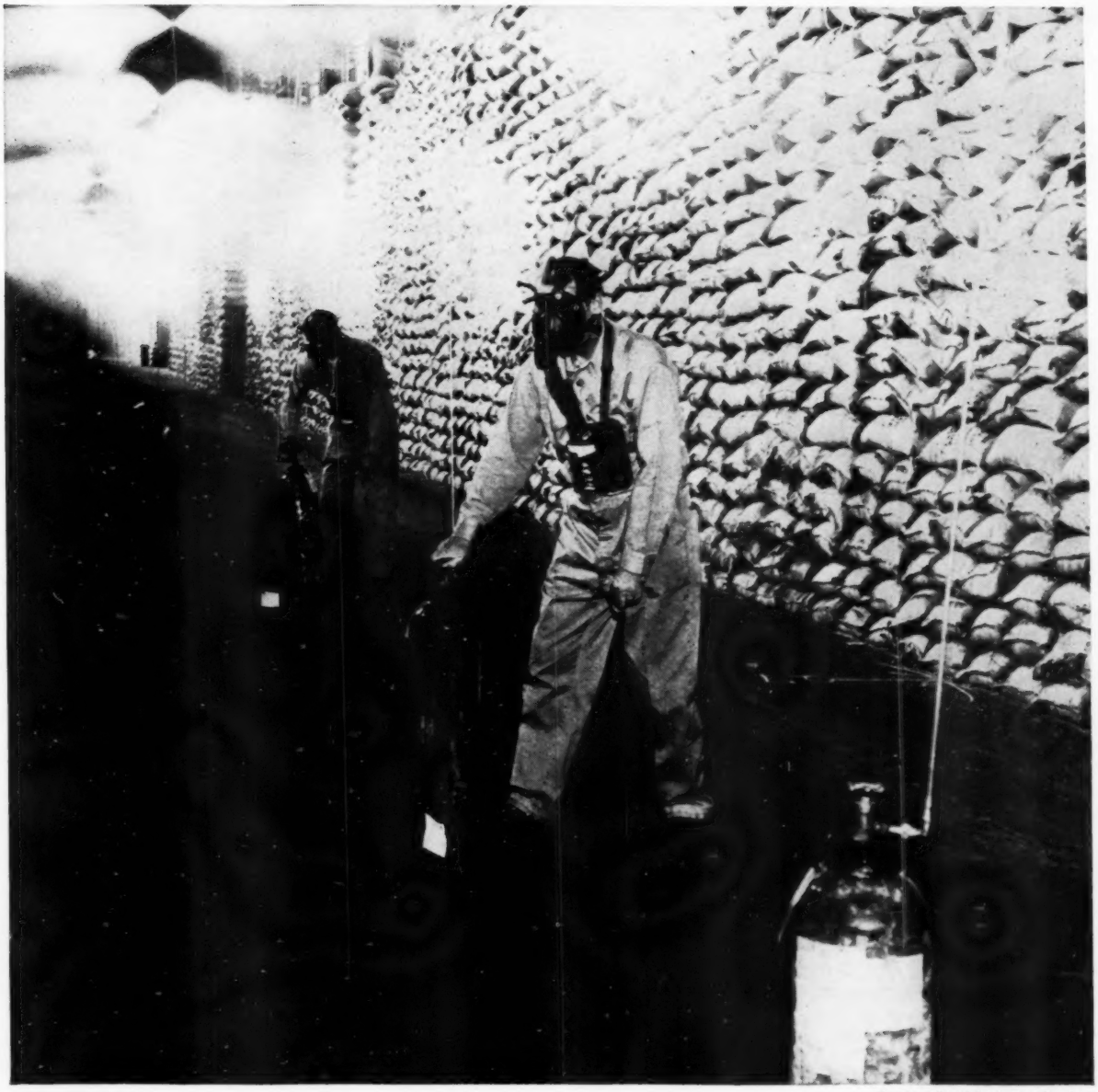
'58-'59 Iowa PCA officers, pictured left to right at the association's two-day Short Course, are president Fritz Berger, Atomic Pest & Termite Control, Ottumwa; vice president, William Kohlhaase, Industrial Termite Control, Inc., Ottumwa; and secretary John Peterson, Hawkeye Exterminating Co., Des Moines. Charles Zilm of The Antimite Co., Des Moines, was re-elected treasurer, but was not present when the picture was snapped.

Hold Iowa Short Course

Bird and community mosquito control received major program emphasis at the 11th Annual Pest Control Short Course at Iowa State College in Ames March 6-7. Fifty-four attended.

Appearing on the program were Dr. Harold Gunderson, ISC extension entomologist; H. J. Stockdale; R. B. Moorman; Cal Fremling; and Dr. John Herrick.

A special program highlight was a class by Dr. Gunderson on how to determine bids on termite jobs. As part of the class, bids submitted by conferees on one sample job ranged from $355 to $607 with an average of $443.65.



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Made under rigid quality control, Dow Methyl Bromide always measures up to the high performance standards you expect of this superior fumigant. And Dow Methyl Bromide comes to you in clean, moisture-free cylinders. There are no impurities to contaminate stored commodities or to foul equipment. You'll find Dow Methyl Bromide a superior fumigant for insect and rodent control in a wide variety of stored commodities.

For spot fumigation of processing machinery and equipment, you'll want to order Dowfume® EB-15. And for grain fumigation, you'll find exactly the right formula to fit your needs from the complete Dow line of liquid fumigants which includes Dowfume EB-5, Dowfume 75, Vertifume® and others. These job-tailored fumigants are the result of years of development and on-the-job experience. For complete information on Dow Methyl Bromide or liquid grain fumigants, write to: THE DOW CHEMICAL COMPANY, Fumigant Sales Section, Midland, Michigan.

YOU CAN DEPEND ON DOW

Primer

How's Your Vocabulary?: 4

To help you find out how your vocabulary stacks up, the editors of PC have scrambled the list of entomological terms and their definitions below. See how many you can match up correctly. If you're puzzled over the pronunciation of words, check the phonetic guide in italics. Capital letters in the guide indicate where emphasis is placed.

List is from Purdue University.

1. ___ diurnal *(dye UR n'l)*
2. ___ dorsal *(DOR s'l)*
3. ___ ecdysis *(EHK deh sis)*
4. ___ ecology *(ee KAHL oh gee)*
5. ___ ectoparasite *(ek toh PARE uh sight)*
6. ___ ectophagous *(ek TAHF eh gus)*
7. ___ egg *(ehg)*
8. ___ elytra *(EL eh truh)*
9. ___ embryo *(EM bree oh)*
10. ___ endemic *(en DEM ik)*
11. ___ endo- (prefix) *(EN doh)*
12. ___ endophagous *(en DAHF eh gus)*
13. ___ entomogenous *(en toh MAHJ eh nuss)*

(a) the process of casting the skin; moulting.
(b) of or belonging to the upper surface.
(c) active or habitually flying by day only.
(d) wing cases, the anterior leathery or chitinous wings of beetles, serving as coverings to the hind wings, commonly meeting in a straight line down the middle of dorsum in repose.
(e) an external parasite; e.g., flea.
(f) growing in or on an insect; e.g., fungi.
(g) feeding internally on prey.
(h) the young animal before leaving the body of the parent or before emerging from the egg.
(i) within, i.e., endoparasite, an internal parasite, as the tapeworm.
(j) the physiology of organisms in relation to their environment; the reactions of organisms to the conditions of their existence, including the modifications of these reactions in relation to changes in environment (Folsom and Wardle); ethology.
(k) a simple cell, capable of fertilization, containing the germ, the food-yolk necessary for its nutriment, and covering membrane; a single ovum or cell from an ovary; the first stage of the insect.
(l) feeding externally.
(m) peculiar to a given region; native, not introduced; applied to species or higher groups (Tillyard).

Answers on page 70

KEEP UP WITH PEST CONTROL

ADVANCES IN PEST CONTROL RESEARCH

Edited by R. L. METCALF, University of California Citrus Experiment Station, Riverside, California.

In universities and research institutions scientists are working out new treatments, testing new compounds, learning more about how insecticides and fungicides do their work.

Practical pest control men in the field need the latest scientific results to be brought to them, so that their methods can be as up to date as possible.

Dr. R. L. Metcalf, a noted scientist in the field of pest control, edits a series of books, in each of which a round dozen of scientists report on their results. **Advances in Pest Control Research** will bring **Science** to the **front line** of **Pest Control.**

VOLUME I: 522 pages, 11 illus., 13 tables. $11.00

VOLUME II: In preparation.

OTHER INTERSCIENCE BOOKS ON PEST CONTROL

ANALYSIS OF INSECTICIDES AND ACARICIDES: A Treatise on Sampling Isolation, and Determination, Including Residue Methods.
By FRANCIS A. GUNTHER, Associate Insect Toxicologist **and ROGER C. BLINN,** Principal Laboratory Technician, University of California, Citrus Experiment Station, Riverside, California.

Careful chemical analysis is most necessary for the successful use of insecticides, and for detecting possibly harmful residues.

"The volume is a masterful presentation of the subject and should prove invaluable to anyone concerned with the analysis of insecticides and acaricides." —Science

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ORGANIC INSECTICIDES: Their Chemistry and Mode of Action
By ROBERT L. METCALF, Entomologist, University of California, Citrus Experiment Station, Riverside, California.

There has been a revolution—in man's constant struggle against insect enemies. We design and choose our weapons, instead of picking them haphazardly.

A noted scientist explains the HOW of insecticides, and the WHY of selecting just the right one for any particular pest control job.

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Calendar

CDC Insect Control Operational Training Course, Purdue University, Lafayette, Ind., April 7-11.

Oklahoma Pest Control Assn.'s April Meeting, Room 122, Oklahoma Capitol Building, Oklahoma City, April 8, 7:30 p.m.

Eastern Pennsylvania Pest Control Assn.'s April Meeting, Sylvania Hotel, Philadelphia, April 10, 6:30 p.m.

Western Pennsylvania Pest Control Assn.'s April Meeting, Webster Hall Hotel, Pittsburgh, April 10, 8:00 p.m.

(New York) Professional Exterminators Assn.'s April Meeting, Museum of Natural History, New York City, April 14, 8 p.m.

Fourth Annual Clinic, sponsored by Illinois Pest Control Assn., with cooperation from University of Illinois and Illinois Natural History Survey, Robert Allerton Park, Monticello, April 15-17.

Maryland Pest Control Assn.'s April Meeting, Park Plaza Hotel, Baltimore, April 17, 6 p.m.

Northwest Pest Control Assn.'s April Meeting, Standard Club, Minneapolis, Minn., April 17.

Sixteenth Annual Canadian Pest Control Operators Conference, Queen's University, Kingston, Ontario, April 17-19.

Chemical Specialties Manufacturers Assn. Mid-Year Meeting, Netherlands Hilton Hotel, Cincinnati, O., May 19-21.

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Disposable Aerosol Insecticide (DAI) formula kills flies, mosquitoes, wasps, gnats, other flying insects instantly, safely! Guaranteed concentrated formula in several times stronger than usual household aerosols. D.A.I. includes .700% Pyrethrins for quick knock-down and kill. Equally effective against both resistant and non-resistant insects. Won't irritate throat and nose—won't leave oil residue on foods, walls, floors and fixtures—meets all Government (ICC) safety requirements.

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AMA Drafts Model Label Law

A model law for the precautionary labeling of hazardous substances in commercial, household, and industrial chemical products has been formulated by the Committee on Toxicology for the American Medical Association.

"The proposed model law," Dr. Bernard E. Conley of Chicago, Ill., secretary of the AMA's Committee on Toxicology, said, "was drafted after an exhaustive 15-month review of existing statutes revealed a hodge-podge of local regulations for the labeling of chemicals." For more information, write the AMA at 535 N. Dearborn St., Chicago 10, Ill.

Arwell Awards Camera

Arwell, Inc. of Waukegan, Ill. awarded a Polaroid Camera as first prize and a transistor radio as second prize during a booth drawing conducted recently at an annual convention of Farmers Grain Dealers of Illinois in Peoria. First prize winner was John Troyer, Chestnut, Ill.

Available in Commercial Quantities DDVP

DIMETHYL DICHLORO VINYL PHOSPHATE is now being used in sugar-based fly baits and as a phoracide in mushroom culture. Because of its high insect toxicity in very low concentrations, and its relatively low toxicity to warm-blooded animals and lack of residue, experimental work is suggested in many fields of application.

DDVP is now being supplied in commercial quantities for authorized uses and in experimental quantities to qualified experimenters.

Available in Commercial Quantities DET

DIETHYL TOLUAMIDE, a "most" successful wide-spectrum insect repellent developed by the U.S.D.A. and Army Quartermaster Corps.

Montrose DET is guaranteed to contain 95% minimum meta isomer, the most effective isomer as shown by field tests. DET aerosol, lotion and spray formulations were successfully marketed in 1957. Montrose DET is available for prompt shipment from stock.

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Exclusive Sales Agents
10 Rockefeller Plaza, New York, N. Y.
Tribune Tower, Chicago, Ill.

Va. Smelting Fly Booklet

A two-color, 12-page pamphlet, covering "Sanitation and Fly Control" in food handling establishments, has been prepared by and is available from the Lethalaire Division of Virginia Smelting Co., Box 144, West Norfolk, Va. The booklet describes the importance of sanitation, tells why flies are a serious health problem, lists general sanitation rules, and discusses use of Virginia Smelting's Lethalaire aerosol for fly control.

Eaton Ready-Mix Rodent Baits

New ready-mix "Fumarin A-C" baits that reportedly end rat and mouse bait shyness are now available from J. T. Eaton & Co. in four alternate flavors: meat, fish, coconut, and molasses.

For more information and a free bait sample, write J. T. Eaton & Co., 1106 Lakeview Road, Cleveland 8, O. When writing for a sample, indicate flavor preference.

Publications for PCOs

Here are the latest government, university and association publications of interest to pest control operators. Some can be obtained free of charge, while others are nominally priced. When ordering, include title and catalog number, if any. Sources follow booklet titles.

Insect Control in Flour Mills. Agriculture Handbook No. 133. 1958. 28p. 15c. Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Suggestions for Fly Control in Poultry Establishments. ARS 33-45. 1958. Insects Affecting Man and Animals Research Branch, U. S. Department of Agriculture, Washington 25, D. C.

Controlling Insect Pests of Stored Rice. Agriculture Handbook 129. Office of Information, U. S. Department of Agriculture, Washington 25, D. C.

Louse Infestation. Catalog No. FS 2.50:26/3. Rev. 1957. 4p. 5c. U.S. Government Printing Office, Division of Public Documents, Washington, D.C.

Studies of DDVP for Control of Cigarette Beetles in Tobacco Warehouses. AMS-214. 1957. 16p. Marketing Research Division, Agricultural Marketing Service, U. S. Department of Agriculture, Washington 25, D. C.

Common Diseases of Important Shade Trees. Catalog No. A 1.9: 1987. 1948. 53p. 25c. Superintendent of Documents, U S. Government Printing Office, Washington 25, D. C.

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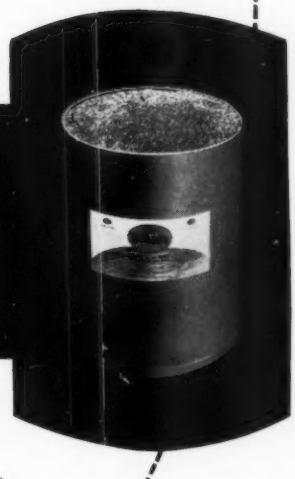

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Notebook

TIPS AND IDEAS FROM THE FIELD

Good Conduit Leads To Wasps' Death

by Simon H. Ratner

Ratner Exterminating Co.
Washington, D. C.

By the time we were called in by officials of a Washington prep school late last summer, yellow jackets that had invaded a boy's dormitory had already stung two students, 15 to 20 times each, in what threatened to be an even more serious problem. Their two adjoining rooms were heavily infested.

My son, Mark, and I discovered the bees were entering one of the rooms through molding that was not tight on the baseboards, and also through wall openings for the window sash cords. But we could not determine how the wasps were getting into the wall. At dusk—wearing rubber gloves, heavy clothing, and netted hats—we went outside and found the answer: a small hole where two conduit wires entered the building from an outside electrical box.

Once we had this artery of entry singled out, we plugged the loose joints of the baseboard with chlordane-soaked cotton, then sprayed 2% chlordane and .5% Pyrethrum in an emulsion through the small opening in the wall where the conduit wires entered. In 36 hours, all the wasps in the walls were eliminated.

Cyanogas would probably have been just as effective, of course, but we couldn't evacuate the dormitory.

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FUMO-KILL can be obtained in 2 oz. (enough for up to 6,000 cubic feet)—4 oz. and 1-lb. cans.

Cost of 12—2-oz. Cans	$ 7.50 per doz.
Cost of 12—4-oz. Cans	13.50 per doz.
Bulk	4.50 per lb.

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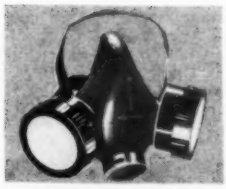

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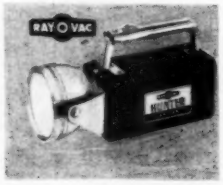

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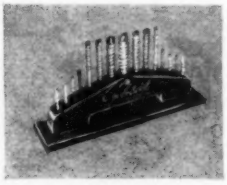

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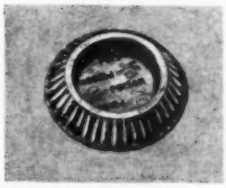

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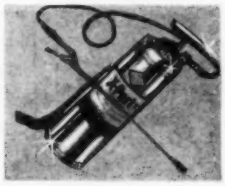

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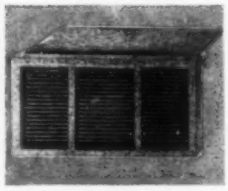

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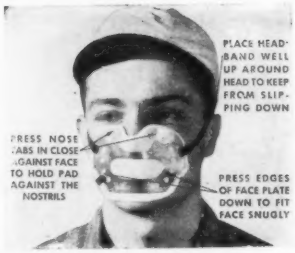
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Fate of Insecticides

(from page 14)

true with larvae of the diamond back moth.

Sunlight affects some insecticides. DDT, for instance, is degraded to non-toxic substances on exposure to sunlight, and Nurova (1953) concluded from his work that residues of DDT emulsions were more persistent in sunlight than dust residues.

Insecticides, then, are subject to all sorts of influences after they are applied. They may persist in the form in which they were applied for long periods. They can be adsorbed and deactivated, only to be desorbed later, in active form. They are washed off, blown away, and evaporate. They may be broken down, or souped up. Sometimes they can be protected by various means, sometimes they cannot. Almost every factor in their environment can have some effect on them.

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Answers to Primer
On page 64

1. (c) **2.** (b) **3.** (a) **4.** (j) **5.** (e) **6.** (l) **7.** (k) **8.** (d) **9.** (h) **10.** (m) **11.** (i) **12.** (g) **13.** (f)

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Mr. PCO—if mothproofing is not now a part of your present operations it will be well worth your while to consider offering this profitable service.

Not only will you increase the scope of your present operation, but the potential of new customers will widen your field and help to increase your overall business. 5 Year Guaranteed Moth Chek has been proven effective by numerous independent laboratory tests* and protects against the ravages of moths and carpet beetles.

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Flame Chek flameproofing service is now available to PCOs. Flame Chek protects carpets, draperies, curtains and upholstery. Field is unlimited - schools, offices, theatres, nite clubs, hotels, motels and homes are all potential users of this service.

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Supermarket Fly Control

(from page 11)

mined on the basis that the store contained no live flies each morning before business operations were resumed.

If there were no live flies in the store before business started each morning, it can be properly surmised our chemicals effectively killed any flies that were in the building the previous day.

One must realize that even with proper screening, some flies can enter the store during the course of any one day. Inasmuch as these stray flies must rest on treated surfaces before they are killed, there is a time element involved before these flies are actually killed. Consequently, at any one time there will probably be a minimum number of flies that got into the store that day but hadn't had time to be in contact with chemically treated surfaces long enough to get killed. All flies that enter during a particular day should be dead by the time the next morning rolls around. This gives your chemicals the approximate 12-hour nighttime period to work.

If a treated supermarket is fly-free in the morning before doors are opened to customers, but develops a serious fly problem during the day, probably one or two conditions exist: there is either improper sanitation within the building that's causing fly breeding and population build-up; or prevention measures are poor and undue numbers of flies are able to get into the store through open windows, doors, cracks, etc. In either case, you've got to find out the trouble and insist remedial action be taken if your customer expects you to give fly control that works.

Market PCO Safety Decals

Yellow and black 10" x 14" safety decals, imprinted with "Drive Safely and Leave the Exterminating to Us!" are being offered for vehicle and equipment usage by Safety Products Co., 2710 Pendleton Ave., Anderson, Ind.

Donald C. Baxter of Safety Products said the police department in Anderson likes this particular safety promotion idea so much, it plans to publicize the decals during Anderson's Safety Week.

In addition to safety promotion, the decals are said to stimulate sales, attract attention, and create goodwill through public relations. Printed with non-fading ink, they are easily applied and last for years, according to Safety Products.

New Root-Lowell Catalog

A special 23-page, illustrated catalog covering its line of sprayers and dusters for pest control operators and sanitation experts is available from Root-Lowell Corp., 445 N. Lake Shore Dr., Chicago 11, Ill. Feature of the catalog is a description of Root-Lowell's Pro Sprayer line, specifically designed for the PCO. When writing for a copy, request Catalog No. 90.

For Hidden Roach Infestations

Pyrethrum formulations have been found successful in many cases for locating hidden roach infestations, since pyrethrum irritates roaches on contact and forces them to leave their hiding place. A synergist added to pyrethrins will increase kill of flushed-out roaches.

An Open Letter To P.C.O.s

To: Mr. Pest Control Operator

Subject: Pestron A Most Valuable Tool for Control of Interior Pests.

Before you invest in any new spray equipment, make sure you consider a machine made especially for your needs.

The Pestron Dry Vapor Projector is guaranteed to perform profitably and to make it easier for you and your serviceman to get more done in less time and with much less effort.

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Remember Pestron is **tailor-made** for your pest control jobs.

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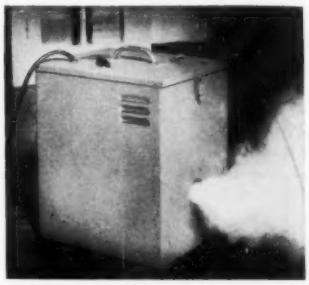

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***When you send your check with order deduct 2% for cash.**

Dow Lists Commodities Unsuited for MB Fumigation

Methyl bromide, a fumigant which has proved its value in protecting a wide variety of stored commodities from rodent or insect damage, is regarded as unsuitable for a limited number of products. Dow Chemical Co. of Midland, Michigan has listed 15 classifications of commodities that should not be exposed to MB or should be exposed only under very carefully controlled conditions.

Some materials, Dow said, have sorptive qualities or a solvent effect which will reduce the MB concentration in the fumigated area to ineffectiveness. Other reasons enumerated for caution include phytotoxicity (toxicity to growing plants), destruction of seed viability, and rapid deterioration of food commodities such as fruit and vegetables.

"The most common reason for avoiding fumigation of a material with methyl bromide is the off-odor resulting from a reaction of the fumigant with certain sulfur compounds," Dow stated. "These odors usually persist indefinitely and in most cases there is no practical way to remove them."

Included in Dow's list of materials to avoid with MB were the following:

1. Foodstuffs: (a) Iodized salt stabilized with sodium hyposulphite; (b) full fat soya flour; and (c) certain soap powders, baking sodas, and salt blocks used for cattle licks.

2. Certain rubber goods: (a) sponge rubber; (b) foam rubber as in rug padding, pillows, cushions, and mattresses; and (c) rubber stamps and other similar forms of reclaimed rubber.

3. Furs, horsehair, and pillows (especially feather pillows).

4. Leather goods, particularly white kid or any other leather goods tanned with sulfur processes.

5. Woolens.

6. Viscose rayons or rayons manufactured by a process in which carbon bisulphide is used.

7. Paper: (a) silver polishing papers; (b) certain writing and other papers cured by sulphide processes; and (c) photographic prints and blueprints stored in quantity.

8. Photographic chemicals.

9. Rug padding.

10. Cinder blocks or mixed concrete and cinder blocks.

11. Charcoal materials.

12. Seeds for planting.

13. Bulbs for planting.

14. Pets, including fish and birds.

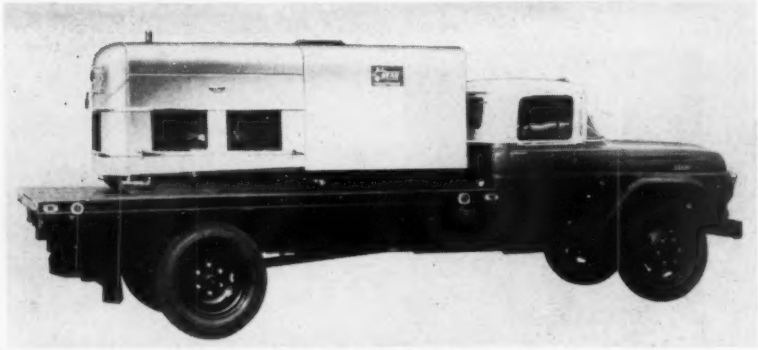
15. Living plants or nursery stock.

New Non-Binding Bit

A new line of "Slo-Spiral" carbide-tipped 6" rotary bits that are reportedly anti-binding and specifically designed for termite control work is now being offered by New England Carbide Tool Co., 55 Commercial St., Medford, Mass.

According to the manufacturer, Slo-Spiral bits will drill without binding in green concrete, marble, or other high bulking material. A long, high capacity Slo-Spiral groove in each bit is said to provide highly efficient removal of bulking material from cutting zone, which eliminates work stoppages and increases life of the bit. These bits are available in diameters from 3/16" to 1/2".

New England Carbide bits are sold at industrial and construction supply houses.



For shade tree spraying and pest, brush, and weed control, the 60-MT hydraulic sprayer manufactured by John Bean Division, FMC, features the new John Bean Royal 60 pump, a fully enclosed triple plunger type pump which reportedly has positive oil bath lubrication on all moving parts. The direct drive pump uses "back-to-back" plunger packing that allows plunger cups to expand on suction as well as on the pressure stroke. This is said to assure maximum capacity at all times. Reportedly capable of 60 gpm with an adjustable pressure up to 800 pounds, the pump operates at 520 rpm. The Royal 60 also features special ceramic Sapphite cylinders which resist wear from abrasive spray chemicals, according to the manufacturer. It is powered by a 45 hp engine and has a 600-gallon capacity, corrosion resistant, Bean Bond tank. A 1,000 gallon tank is optional. Sprayer is 10½ feet long, four feet high, and five feet wide, and can be mounted on short wheel base trucks. For more information, write John Bean, Lansing 4, Mich.

"Electric Selector" three-color merchandising aid to show buyers which sprayer or duster is recommended by the manufacturer for specific jobs, is being offered retailers by H. D. Hudson Manufacturing Co., Chicago. Selector is available without cost with the H. D. Hudson No. 58 Sprayer and Duster Starter Assortment. Fourteen types of Hudson equipment, both hand- and power-operated, are described and illustrated on the board. Job descriptions cover spraying and dusting, both inside and outside the home, as well as on farms. To operate the Selector, a plug at the end of a wire is inserted into a hole next to one of the job descriptions, and when contact is made, a light flashes alongside the sprayer or duster the manufacturer feels is best suited to the buyer's needs for that job. To obtain more details, write H. D. Hudson at 589 East Illinois Street, Chicago 11, Illinois.

Sells Interest in PCO Firm

Mrs. Kenneth D. McLeod severed her connections with McLeod Industrial Fumigators and City Exterminating Co., Buffalo, N.Y., the middle of last month, and sold her interest in them to her son, Donald McLeod.

Don McLeod has taken complete charge of all operations, except those in the Rochester branch, which has been sold by him and his mother to Mr. and Mrs. Dudley Sawyer.

The Rochester branch will continue operating under the name City Exterminating Company of Rochester, Inc.

Commonwealth Extg., Va. Moves

Commonwealth Exterminating Co. of Roanoke, Va. has just moved into its own new $40,000 three-story office building on U. S. Route 11 in Roanoke, according to Commonwealth president Ray K. Parks.

5,000 Not 500

A typographical error in the Universal Paper Products Co. advertisement on page 48 of our February issue gives the number of Rat Jiggers packed in a case as 500.

The company informs us Rat Jigger rodenticide containers are packed 5,000 to a case, with the minimum order being four cases shipped pre-paid. The company is located at 380 Lexington Ave., New York 17, N. Y.

REPEAT SALES... ...build steady PROFITS!

NEW AER-O-MATIC ELECTRIC DEODORIZER

Create new sales and build steady refill repeat profits with this new electric deodorizer that opens completely for easy access, for maintenance and servicing. Cleans and refreshes the air silently, steadily, twenty-four hours a day. Scientifically developed neutralizing agent reaches every corner of the rest room.

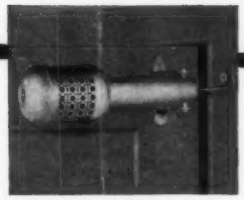
WALL BLOCKS AND BLOCKETTES AVAILABLE FOR PRIVATE LABELING

AER-O-MATIC WALL BLOCKS

100% Paradichlorobenzine deodorant block with subtle scents added by exclusive process to assure fragrant aroma for life of the block. Available in attractive hanger type containers.

AER-O-MATIC BLOCKETTES

Every type of Blockettes, wired bowl blocks and general use deodorizing blocks available in many sizes and styles. Write for literature and prices, today.



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AER-O-MATIC DOOR TYPE DEODORIZER

This low-priced, highly profitable automatic door type deodorizer perfumes the air every time the rest room door is opened or shut. Sturdy construction—requires no electricity or wires.

AER-O-MATIC Trade-Mark Reg. Products

ALLIED BLOCK CHEMICAL COMPANY

Fifth & Bingham Streets • Pittsburgh 3, Pa.

The ORB BOMB

contains a high potency non-toxic formula made especially for commercial and industrial use. Only 2 seconds is needed to treat 1,000 cu. ft. of space for flies. Controlled spray rate prevents waste. Fine particle size eliminates spotting.

Other **ORB** Aerosol Products Available

- **Air Refresher & Deodorant**
- Orb Mothproofer
- **Orb Moth Control**
- Industrial Aerosol Insecticide
- **Aerosol Insecticide with Perthane**
- Roach & Ant Bomb
- **Dust Mop Spray**

All Aerosols Available Under Private Label. Custom Filling on special products.

ORB INDUSTRIES

Write for prices, details

Wallingford Rd.
Media, Penna.

Extra Profits!

Bird Proofing Buildings WITH

Bur-Co

Low cost . . . easy to apply. A sure-fire extra profit service to offer your customers.

Bur-Co is a chemical bird repellent, guaranteed to keep birds away from ANY building, when used according to instructions. Eliminates unsightly — and damaging — bird droppings. Non-harmful to humans or birds. Does not damage buildings . . . replaces expensive, hard to install mechanical devices.

Comes in convenient cartridges, cans or drums. Easily applied to building with caulking gun or compressor for larger jobs.

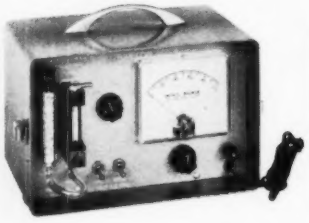
Bur-Co
A PROFITABLE ADDITION TO ANY JOB

Write Dep't. C For Details Today!

BUR-CO BIRD REPELLENT

Burr CHEMICAL COMPANY
3329 AUBURN STREET
ROCKFORD, ILLINOIS

SURE Kill every time



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eliminates guess work...

...provides accurate on-the-spot measurements of methyl bromide concentrations from any number of test areas inside the volume being treated.

Accurate to two oz. per 1,000 cubic ft., this scientific instrument is completely self-contained and will provide years of trouble-free operation. Available in standard 115 volt A.C. models (shown above) and in portable battery-powered units. WRITE TODAY FOR COMPLETE DETAILS.

ROBERT K. HASSLER CO.
P.O. BOX 177, ALTADENA, CALIF.
SYcamore 5-3278

WORRY WON'T CURE CANCER

If cancer is detected in its early, localized stage, the chances for cure are very much better. Play it safe and smart. See your doctor for a checkup every year.

And fight cancer with a check!

Mail it to CANCER, in care of your local post office —NOW

AMERICAN CANCER SOCIETY

Suppliers' Staff Changes

Michigan Chemical Corp., Saint Louis, Mich., recently added **Dr. Donald E. Overbeek** to its research staff, Dr. Dwight Williams, Michigan Chemical's Director of Research, has announced. Dr. Overbeek previously was a research chemist with Stauffer Chemical Co. of Chauncey, N. Y.

Dr. William P. Utermohlen, Jr. has been appointed Director of Research for Velsicol Chemical Corp., Chicago, Illinois, according to Dr. Robert O. Sauer, vice president of Research and Development for Velsicol. Before joining Velsicol, Dr. Utermohlen was Assistant Research Director for the Toni Division of the Gillette Co. His office is Chicago.

Dr. Henry Gray, formerly project leader in insecticides and stored product fumigants for The Dow Chemical Co., Midland, Mich., has been appointed a Dow field specialist for Michigan, Indiana, Illinois, Ohio, and Kentucky.

Geigy Agricultural Chemicals, Division of Geigy Chemical Corp., Ardsley, N.Y., has announced the formation of four sales districts to facilitate nationwide distribution of its products. Coordination and supervision of over-all district sales operations have been assigned to **L. G. Gemmell,** assistant to the Division President, Dr. G. R. Ferguson. **J. J. Hood** has been appointed Assistant Sales Manager in charge of Technical Services. The Eastern Sales District, covering the territory from Maine to Florida, has been assigned to **S. C. LeVasseur** with offices at Ardsley. **L. C. Ohle,** with offices in Kansas City, Mo., has been named District Sales Manager for the South Central District, which includes Colorado, Nebraska, Missouri, Tennessee, and states south of these. The North Central District, comprising the northern section of the Midwest farm states, will be the charge of **Haskell Tison** at Geneva, Ill. **C. L. Turzan,** Fresno, Calif., has been named District Sales Manager for all states west of the Rocky Mountains.

Leo Miles has been appointed Simazin Industrial Sales Specialist with Geigy Agricultural Chemicals of Ardsley, N.Y. Before joining Geigy, Miles worked for U.S. Borax and Chemical Corp. as a New York-New England field representative.

Termite pump with handles. A specially-designed termite pump, with detachable side handles to make it convenient for lifting from the back of a truck or station-wagon, is now available from Associated Sales & Supply Co., 5137 Southwest Ave., St. Louis, Mo. Handles insert into the framework, upon which the pump rests, and are disengaged by turning them slightly to one side. The 300-pound unit also rides on two pneumatic tires, which add to its portability. Called Model No. 5500, the unit features a double-cylinder piston pump, that can reportedly develop up to 300 P. S. I., and a discharge capacity of four gallons a minute. The suction end of the pump is fitted with a fine screen to catch any dirt that may be in the chemical solution. Capacity of the tank is thirty gallons.

Sanitation Violators

Unlawful contamination of food and infestation of dwellings by insects and rodents is bringing seizures or condemnations by Federal, state and local enforcement authorities. Here are some of the latest violations and convictions.

A Lawrence, Mass. baker whose bread and rolls were contaminated by insects and prepared in an insanitary plant was given a suspended sentence of one year in jail and a suspended fine of $400. He was placed on probation for two years.

Another Lawrence, Mass. food processor was fined $400 for dealing in flour and bran contaminated by insects.

In Denton, Tex., a milling company manager was fined $500, which was suspended for one year, and his firm was fined $1,000 for insanitary conditions in the plant. It was infested by rodents and insects.

A co-op and its manager in Knights Landing, Calif. were fined $75 each when it was proved beans in their possession were contaminated by a pesticide chemical.

Beans and peas contaminated with pesticide chemical and rodent filth in a Ribbins, Calif. food plant resulted in $100 fine each for the company and two partners.

A seafood processing firm in Chelsea, Mass. was fined $1,000 and its president $100 when Federal authorities discovered the company's fish was contaminated with insect filth and prepared under insanitary conditions.

Fogging Machines

BRAND NEW **GOVT. SURPLUS**
in original crates

Exterminator Corp. of America Doing Mosquito Control Work

Fogging Machine

Our Price $895 Complete While They Last

Compares with units selling up to $2,000.00
Perfect for Fly and Mosquito Control

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EASTERN RESEARCH CORPORATION

15 South 21st St. **Philadelphia 3, Pa.**

Phone: RIttenhouse 6-6329

SS 56% TC CHLORDANE

(For Household Pests And Termites)

One gallon of SS 56% TC makes 32 gallons of a good 2% emulsion, for the control of household pests.

Three quarts of SS 56% TC makes 48 gallons of a good 1% Chlordane emulsion, for the control of termites.

PRICES
SS 56% TC CHLORDANE CONCENTRATE

5 Gallon Pails at	$4.95 per gallon	$ 24.75
30 Gallon Drums at	$4.80 per gallon	144.00
55 Gallon Drums at	$4.70 per gallon	258.50

Freight Prepaid On 15 Gallons Or More
2% Discount If Check Is Sent With Order

LARGEST STOCK OF RODENTICIDES
For Pest Control Operators

Senco Phosphorus Paste
Pival and Fumarin — Microfine Arsenic
Strychnine Grains — Thallium Grains
Arsenic Solution — Thallium Sulfate

Write For Complete Price List
And Senco News

Sennewald Drug Co., Inc.

2721 Chouteau Ave., St. Louis 3, Mo.

The Original . . .
And Still The Best!

GETZ
POWDER BLOWER

$1.25 EACH
F.O.B. St. Louis, Mo.

GETZ EXTERMINATORS, INC.
2234 OLIVE STREET **ST. LOUIS 3, MO.**

MICE GLUE

GETS MICE LIKE FLYPAPER GETS FLIES

7½ lbs. $1.00 per lb. **25 lbs. $.90 per lb.**
100 lbs $.80 per lb.

BIRD-REPELLENT

Keep Pigeons, Starlings and Other Birds from Buildings

7½ lbs. $1.00 per lb. **25 lbs. $.90 per lb.**
100 lbs $.80 per lb.

PEST CONTROL CHEMICAL CO.

324 Broadway **Write for details** **Buffalo, N. Y.**

KILL FLIES!

. . . By the hundreds
. . . By the thousands
. . . By the millions

With FLY FLAKES®

Easier · Quicker · Longer-Lasting
Nothing to Mix · Simply Scatter Around

A single pound killed more than a million flies

Package sizes: 2, 5, 10 & 25-lb. bags; 1-lb. shaker cans.

MANUFACTURED BY
FLORIDA AGRICULTURAL SUPPLY COMPANY

FASCO

Division of Wilson and Toomer Fertilizer Co
Jacksonville, Florida

Classifieds

When answering ads where box number only is given, please address as follows: Box number, c/o Pest Control, 1900 Euclid Avenue, Cleveland 15, Ohio.

Rates: "Position Wanted" 5c per word, minimum, $1.00. All other classifications, 10c per word, minimum $2.00. All classified ads must be received by Publisher the 10th of the month preceding publication date and be accompanied by cash or money order covering full payment.

POSITION WANTED

EXECUTIVE POSITION DESIRED. Have 20 years of extensive experience in directing all phases of a complete pest control business, including fumigation, termite proofing, pest control service, promotion, sales and customer relations. I have the initiative, good judgment and the ability to work; am 42 years of age and am willing to accept employment anywhere. If you are interested in a high type individual who can take over and operate an entire organization, write Box 464, Pest Control magazine.

HELP WANTED

ENTOMOLOGISTS with structural pest control experience. We have immediate openings for aggressive young men with sales ability and minimum of 2 to 3 years of structural pest control experience to manage offices. Liberal salary, commissions and over-rides enabling hard workers to earn $8-$10,000 annually. Many other company benefits. Must be available immediately. Write giving experience and small non-returnable photograph. Interviews in Pittsburgh at our expense. Write L. L. Crosby, President, Commonwealth Sanitation Co., 3567 Bigelow Blvd., Pittsburgh 13, Pa.

ENTOMOLOGIST with pest control, fumigation and chemical knowledge to manage Los Angeles office. Executive and sales ability required. Write full details. Box 463, Pest Control magazine.

EXTERMINATOR for Los Angeles area. Liberal salary. Must have California license. All replies strictly confidential. Rid-O-Pest Control Co., 3226 W. Juneau, Milwaukee, Wisc.

OPPORTUNITIES UNLIMITED. The world's largest pest control organization (AAA-1 rated) has interesting openings for men with initiative and ambition. We operate in 28 states from coast to coast and there are opportunities open in many phases of our operation . . . servicemen, managers, technical representatives and salesmen. Experience in professions related to pest control helpful, though not necessary. Liberal salary and incentive arrangements provide unparalleled opportunities for men with good judgment and the ability to get along with people. Our firm, over 50 years old, offers employee benefits including paid vacations, sick leave, life insurance, hospitalization and pension plan. All replies confidential. Interviews in Atlanta by invitation at our expense. Write in detail to Orkin Exterminating Co., Inc., 713 Peachtree St., N.E., Atlanta, Ga. Attention: Personnel Dept.

25 YEAR OLD FIRM has opening for supervisor of our Exterminating Department. Must be steady and no drinker. Please state your practical experience in full. Unlimited salary opportunity. Box 461, Pest Control magazine.

IMMEDIATE OPENINGS for pest control operators, with "top" experience, in our Caribbean offices. Permanent and temporary positions available. High salaries, maintenance and transportation furnished. Unusual opportunities. Write or wire immediately L. L. Crosby, president, Commonwealth Sanitation Co., 3567 Bigelow Blvd., Pittsburgh 13, Pa.

SANITARIAN(S) wanted for expanding industry operated sanitation inspection program. Applicants must have college degree and experience as a Federal Food and Drug Inspector or experience with a state or local regulatory agency. Openings currently to be filled are Minneapolis and New York, other openings soon. Some travel involved. Excellent opportunity for intelligent man with an eye for the future. Wanted at once. Box 465, Pest Control magazine.

FOR SALE

GOING, ESTABLISHED CONCERN. Located in large city in Texas. Specializing in termite control, roach control and moth proofing in homes only. Very finest reputation for 20 years. Completely equipped. Total cash price $7,500. Please do not reply unless you mean business and have the cash. Box 466, Pest Control magazine.

TERMITE BUSINESS 15 years old. Earning $11,000 to $14,000 per year. Reason for selling: ill health. Have to change climate. Will sell for $8,000. Oscar Sipes, 2130 Beeler St., New Albany, Ind. Telephone: 44452-41698.

WANT TO BUY

WILL PAY TOP PRICE for exterminating business in New York City area. Cash. Replies confidential. Box 439, Pest Control magazine.

MISCELLANEOUS

DUE TO OTHER INTERESTS, small New York exterminating company wishes to merge with other small business on cooperative basis. Mr. Gold, UN 4-2100.

End **RAT BAIT SHYNESS**

with

EATON'S 4-Flavor

A-C FUMARIN

READY-MIX BAITS

Now you can get complete rat and mouse clean-outs with just one bait, Eaton's A-C, available in 4 different flavor attractants.

Eaton's A-C is a new, insect and mold resistant anti-coagulant formula that features Fumarin blended with 19 taste-tempting ingredients.

PCOs report complete success by keeping acceptance high through alternating usage of these 4 available flavors . . .

Meat, Fish, Coconut, Molasses

Write today for details.

Only 24¾c lb. F.O.B. Cleveland

in 100 lb. quantities

Packed in 50 lb. containers

WRITE FOR FREE SAMPLE!

A free sample of Eaton's A-C Formula will be sent upon request. Tell us which of the 4 flavors you would like to test. Write today to:

J. T. EATON & CO., INC.

1106 Lakeview Rd. Cleveland 8, Ohio

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"For 70 Years Choice For Quality The World Over"

Complete line of hand, continuous, compressed air, knapsack, bucket, wheelbarrow and barrel sprayers and insecticide dusters. Many styles of spray nozzles. Quality design and performance.

Streamlined BLIZZARD Copper Continuous Sprayer

World's Finest
Two Sizes: Pint, Quart (39 ounces)

Solid copper tank. Seamless, highly polished brass pump barrel. Beautiful design. Sturdy construction. Lasts for years. Double nozzle sprays fine, powerful mist straight ahead or at any angle.

E-Z 5 GAL. KNAPSACK SPRAYER

Best knapsack sprayer made. Pump lever quickly developes high pressure. 5 gal. zinc grip steel or copper tank. Adjustable nozzle for 20-30 ft. or short, fine, powerful mist spray. Unexcelled for every spraying need.

RITE SIZE SPRAYER

2 Gal., compact compressed air sprayer. Dome top welded tank 5 ft. hose. 16" curved brass extension. Brass adjustable nozzle. Very popular. Light and easy to use.

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NEW... and IMPROVED WELL CONSTRUCTED POWDER GUN

60¢ EACH

F.O.B. Atlanta, Ga. Plus Parcel Post and Sales Tax Where Applicable

For further information write:
Purchasing Department
ORKIN EXTERMINATING CO., INC.
713 West Peachtree St., N.E.
Atlanta, Georgia

WORLD'S LARGEST PEST CONTROL COMPANY

Why waste valuable time tearing up floors or walls to get rid of *Rat Odors?*

USE DB 455 when Rat Odors Strike!

Don't look for impossible-to-find carcasses. In practically every case, merely sprinkling DB 455 on the floor or into shallow containers completely solves the problem. A ¼-pint bottle takes care of most rat-odor problems. Nothing could be simpler to use. DB 455 will also deodorize rest-rooms, moldy cellars, hospital smells, food and fish odors, etc.

24 ¼-pints DB 455 ..... $9.00

For a free sample or further information write to

SUSAN PRODUCTS
521 Market St., P. O. Box 494, Youngstown, O.

For Laying* POWDERS *in the Right Places...

Put Centrobulbs in your Service Kits!

Use

CENTROBULBS

(Most Professional PCOs Do!)

A Necessity For Applying Powders to

Kill Resistant Roaches!

Silverfish and other crawling insects and for laying Tracking Powders in Rodent Control

Speedy, Neat, Economical

14 ounce	Professional
8 ounce	Standard Resale
4 ounce	Small Resale

FOR LOW PRICES AND FULL INFORMATION SEND FOR CIRCULAR TODAY

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the Leader 4 ways

1. Dependable performance for effective insect control.
2. Quality built to assure low maintenance.
3. Attractive design.
4. Reasonable price for maximum profit.

Each unit covered by $100,000 product insurance. Exclusive feature assures uniform heat dispersion and constant vaporization. Check the Uni-Vap, most reliable in the field, before you buy.

Universal ORTHO-LINDANE — Guaranteed fresh for high potency, and better kill from any vaporizer.

1 oz. heat sealed, leakproof packets
1 lb. cans
Write for new lower prices and literature.

Universal ELECTRIC PRODUCTS CORP.
P.O. Box 3216 4200 So Mendota St.
Madison 4, Wisconsin

Pestales

High voltage mouse. A Des Moines, Ia. motorist puzzled over the frequency of battery failures in his car finally discovered the trouble last month — a mouse had crawled into his car's generator and died. This cut off the generator's current and prevented the battery from charging. *But you can be sure the garage, where the decaying rodent was removed, charged plenty.*

* * *

Rat thievery. Here's how the alert manager of Hygienic Sanitation Co.'s Newark, N. J. office, Robert Hanna, picked up a new service contract a few weeks ago. A suburban Newark storeowner who couldn't get into town with his receipts one evening, hid the $1,800 in paper bags under the floorboards of his store until the next day. The following morning, money and bags had disappeared from their hiding place. Police could find no evidence of a break-in, and only the storeowner and his son knew the money had been concealed under the floor. After some snooping around by a carpenter, the bags were finally found strewn about on the ground beneath the store, where they had been taken by rats. Once a news account of the "theft" was published in the local paper, a telephone call by Hygienic's Hanna sold the storeowner on the need for regular professional pest control service to prevent such "losses" in the future.

* * *

Secondary invaders. In Peiping, the Chinese Communist government has launched a program to rid the city of all flies, mosquitoes, and rodents — *a poor second, apparently, to the "capitalists" who were done-in there a long time ago.*

* * *

Pomerantz on phobias. Charles Pomerantz of New York's Bell Exterminating Co., Inc., one of the headlining-est making PCOs in the business, is still piling up newspaper linage. The Boston Globe recently devoted over a column to Pomerantz' appearance before the Tufts University School of Medicine, where he discussed his experience with insect phobias. Pomerantz also was a guest later at the home of Tufts' Dr. and Mrs. Ralph Wheeler for a symposium on insect phobias.

* * *

Bombay triangle. From Bombay, India, one of our readers (Pest Control India Private Ltd.) tells us of a mousy heckler that almost wrecked a house. Seems the little fellow kept depositing male undergarments in the bedroom of a wealthy Bombay couple. With his mate at a loss to explain such intimate and unfamiliar drygoods in their sleeping quarters, hubby was all ready for divorce until he discovered the rodent intruder in the bedroom one night with a fresh pair of male unmentionables in tandem. *We always knew Bombay was a city of romance and intrigue, but we had no idea even the mice went in for it.*

* * *

Orkin in Florida. Apparently Orkin Exterminating Co. is planning a new base of operations in the Miami, Fla. territory. Word is that Orkin has purchased 3¼ acres of land in Miami, and plans are fresh from the drawing board for a new plant there —at 21st St. and 27th Ave. on the Miami River.

* * *

PCO's "Plumber's Helper." Over a dozen night watchmen in Sydney, Australia have been replaced on their warehouse beats by snakes. The six-foot, nonpoisonous reptiles not only drive prowlers away, but seem to make excellent rat catchers, as well, swallowing their victims whole. — *The PCO's answer to bait shyness?*

* * *

Baseballs to Birds. Burt Smith, 29-year-old ex-professional ball playing son of Jules B. Smith has been named president of Bird-Rid Laboratories of Chicago, which his Dad founded. New vice president is Aaron N. Fleischer, a '51 graduate entomologist from Purdue University.

* * *

Missile mice. Teen-age rocketeers in Austin, Minn. are under a court injunction, which prohibits them from using live mice in their midget missile launchings. The injunction came at the request of the American and Minnesota Humane Societies. *At this rate, they'll have pest control operators behind bars.*

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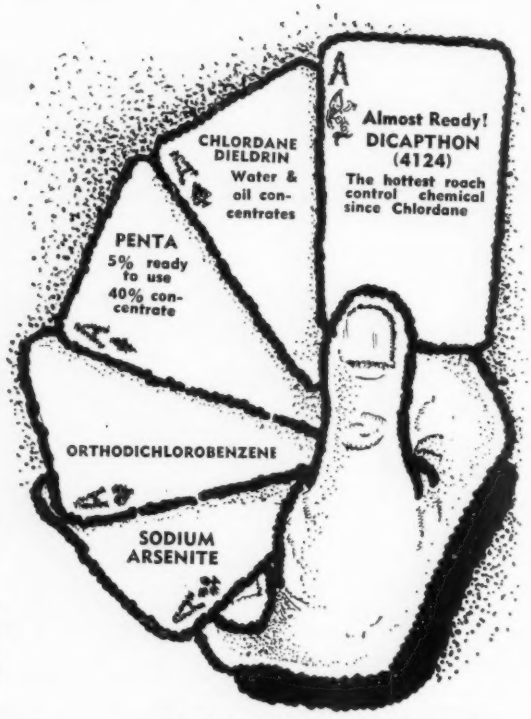

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